October
1960

COMMERCIAL FERTILIZER

and PLANT FOOD INDUSTRY

NOW IS THE TIME
TO CASH IN
ON THE TREND
TO N

SEE PAGE 19

Advertisement of Nitrogen Division, Allied Chemical Corporation

sleek... trim... and perfectly coordinated!

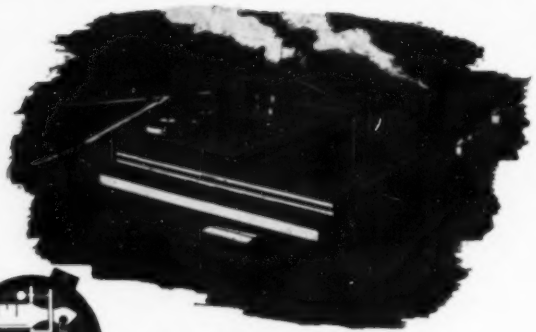
That's our new 300,000 sq. ft. multiwall bag plant at St. Marys, Ga.

Like the building itself, our equipment is new and the very latest in mechanical efficiency.

This fully integrated plant has every facility for turning out every kind of multiwall bag . . . open mouth or valve, sewn or pasted, stepped-end, and our own patented Kraft-lok® valve; also bags with special inserts, sleeves, protective linings or outers, and vapor barriers.

The best in multiwall bags—are Kraft Bags!

. . . and the best in open mouth bag filling machines is The Kraftpacker, for which we are exclusive sales agents.



Paper Mill at St. Marys, Ga.

KRAFT BAG CORPORATION
Gilman Paper Company Subsidiary
630 Fifth Avenue, New York 20, N. Y.
Daily News Building, Chicago 6, Ill.

☐ We would like to know more about Kraft Bag Multiwalls.
☐ We would like to know more about The Kraftpacker.

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ADDRESS_____
CITY_____ ZONE____ STATE_____
PRINCIPAL_____
PRODUCT MFD_____ CF

TC
TENNESSEE CORPORATION

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From One Basic Source

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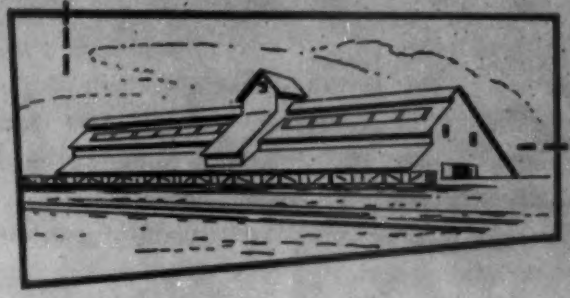
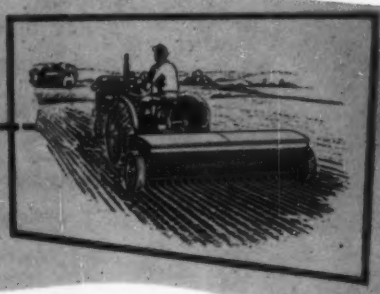
MANGANESE SULFATE
ZINC SULFATE
IRON SULFATE
MANGANOUS OXIDE
MINERAL MIXTURES

Our long years of experience in nutritional trace elements for application in fertilizers, backed by a continuing research program to further improve the quality and performance of these products, is your assurance of highest quality materials at all times.





FOLIAR NUTRITIONAL PRODUCTS—

Iron, Zinc and Manganese Compounds — NU-IRON, NU-Z, NU-MANESE and ES-MIN-EL (a foliar applied mineral mixture).

WITH TENNESSEE FERTILIZER CHEMICALS—

You cut cost with combined carload lots From One Basic Source—Save time, plant space and labor by using our Custom Formulated Mixtures — Combination of Minerals Mixed To Your Particular Specifications.

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HIS GREENEST HANDS WERE TAUGHT TO RUN HIS CONTROLLED GRANULATION PLANT BEFORE WEATHERLY DELIVERED IT

There must be three things we are sure of before we turn over to you the key to your plant: Your people must be operating it, and must know, beyond question, how to run it properly; the plant must be running smoothly; it must be running at designed capacity. For our plants are our testimonials.

All this is basic in Weatherly plants. Your equipment will be designed and installed by Weatherly people. It works well, and keeps on working because of Weatherly techniques. And because Weatherly equipment is meant to be run by average workers, they do it. They are doing it right now in several dozen Weatherly plants in the South and Midwest.

Weatherly "controlled granulation" means complete uniformity of granules — through 6 and on 16 mesh screen. This is guaranteed. So is the production rate.

You can get a premium product from low-cost materials from a Weatherly plant. We can show you how to make a good profit. Would you like to have us talk to you?

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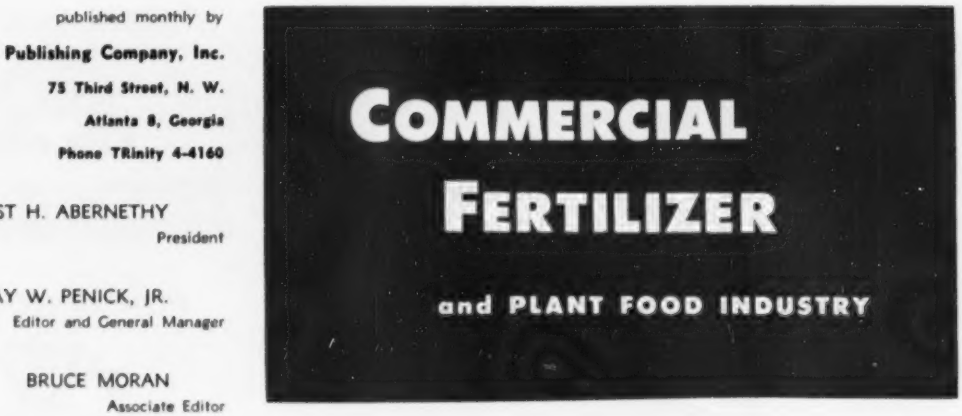

Vol. 101, No. 4 October, 1960

Established 1910

COMMENTING FREELY

by

Bruce Moran

Safety in fertilizer plants is a matter which needs more attention. This is obvious from the figures for 1959, which show that our record was 22.2 per million man hours, as compared with 10.6 for members of the National Safety Council. Fertilizer production need not be that hazardous, if proper precautions are taken, as the result of training.

NPFI has recognized this, in the series of regional schools for the training of supervisors, the final two of which for this year will be held this month and next.

There should not be as many fires as we have in our industry, either. If you cannot find the subject in your safety schools, your insurance company will doubtless be glad to conduct one in your own plant. If this is done, and your safety-responsible people keep behind the recommendations, fewer fertilizer concerns will find themselves out of business just at the height of the season!

These things are management's responsibility. The cost of accidents and fires is great. Prevention is a matter of keeping eternally at it!

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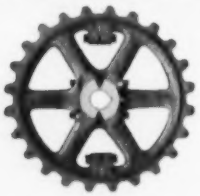
one call... that's all...

FOR CHAIN

FOR SPROCKETS



FOR BUCKETS

Try this: next time you need cast or steel chain, sprockets or buckets for your elevators and conveyors, call your nearby Rex Distributor. Then see what happens. You'll get fast delivery—or even faster if you're up against an emergency. Reason is that your Rex Distributor is fully stocked with a complete Rex line of equipment for the fertilizer industry. And his stock is backed by strategically located CHAIN Belt warehouses.

What more could you ask? Quality? Well, the name is REX—and better quality you can't find anywhere. You'd agree if you could see how Rex Steel and Cast Chains, Buckets and Sprockets are made—and if you could see how they last and last.

For over 70 years people in the fertilizer industry have been calling REX. Why not you, too? CHAIN Belt Company, 4706 W. Greenfield Ave., Milwaukee 1, Wis. In Canada: CHAIN Belt (Canada) Ltd., 1181 Sheppard Ave. East, Toronto.

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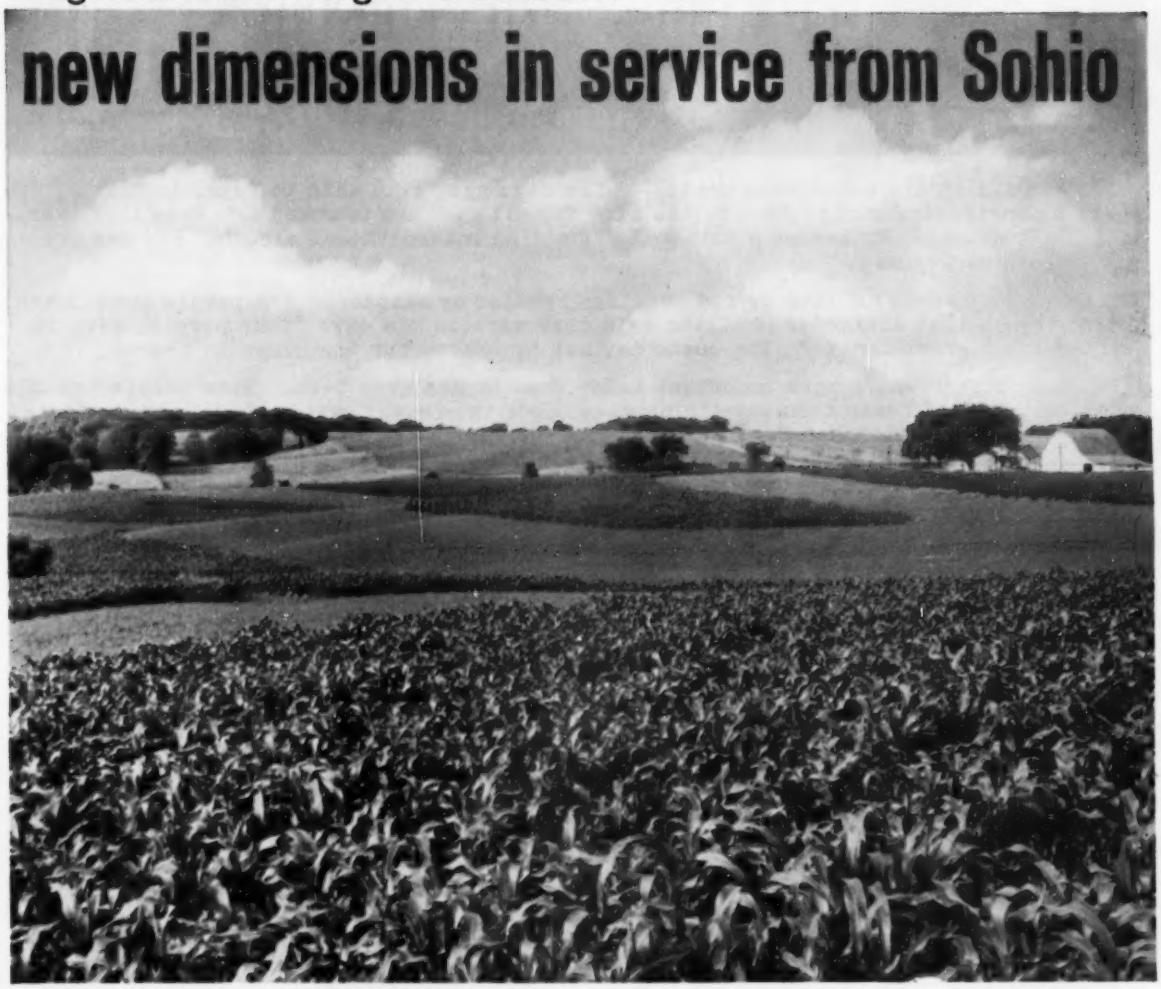
REX IS BEST. . . IN THE USER TEST

Agricultural insight creates...

new dimensions in service from Sohio



"We're serious about *service*" is far more than just a slogan at Sohio, supplier of nitrogen materials for the fertilizer industry. It's a genuine feeling of responsibility to serve your nitrogen needs as completely and as efficiently as we know how.

One vital aspect of Sohio service is *planning ahead* . . . developing improved nitrogen materials, improving services and supporting activities that will benefit the entire fertilizer industry.

In 5 short years at Sohio, this agricultural insight to the needs of the fertilizer manufacturers has led to the development of:

- New solutions with higher nitrogen content . . . less water.
- Higher fixed-to-free ratio solutions.
- Addition of optimum amounts of urea to lower saturation temperatures.
- Solutions adapted to preneutralization.
- Technical assistance and service in using more solutions in making fertilizers.

For more about Sohio service and products, call the "Man from Sohio." He's your link with Sohio's full line of quality nitrogen materials: anhydrous ammonia . . . aqua ammonia . . . coated 45% or uncoated 46% urea . . . 18 nitrogen solutions, including all urea types.

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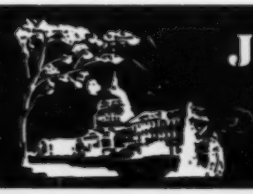
18R-60



JUST AROUND THE CORNER

By Vernon Mount

THE COMIC STRIPS are not always comic. A few days ago Porky said to Pogo, in Walt Kelly's penetrating strip: "Now is the time for all good men to come to." Read that over again. It deserves to become a national, if not an international slogan. For men are half asleep everywhere.

LULLED by soft words; dulled by red herrings; gulled by slickers – the people are all too often, today, what Alexander Hamilton said they were in his day: "Your people, Sir, is nothing but a great beast!" The quote may not be exact, but the sense is there.

AWAKENING is everywhere more important today than it has ever been. More people are under the spell of fewer than were in bondage under the feudal system, before Magna Carta. The independence which has been so prized by the world's thinking millions has been diluted for many, and lost – perhaps permanently – for millions more.

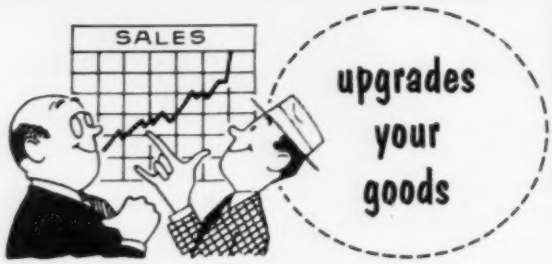
PORKY IS RIGHT: Now is the time for all good men to come to.

Vernon Mount

"Now is the time for all good men to come to"

FUR-AG®

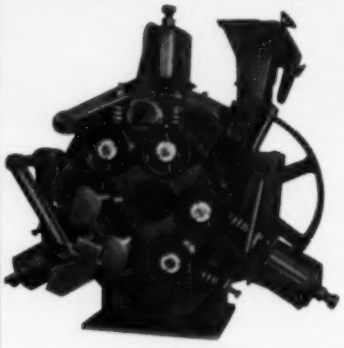
the sterilized organic conditioner



Low cost Fur-Ag does so much for fertilizer quality it's used by leading manufacturers across the country. Fur-Ag reduces bag-set, helps keep goods free-flowing. It speeds up curing in the pile and provides bulk. Sterilized Fur-Ag is free from plant diseases, insects and weed seeds and it has a rich, natural dark color. Available all year 'round in bags or bulk. For full information, write for Bulletin 127.

The Quaker Oats Company
CHEMICALS DIVISION
345 The Merchandise Mart, Chicago 54, Illinois

Investigate the New and Improved



SIX-ROLL KENT ABBÉ MILL

- Six Grinding Rolls instead of three.
- Grinds 8 tons per hour of limestone to a fineness of 97% minus 100 mesh; 10-12 tons per hour of Florida pebble phosphate rock to a fineness of 87% minus 100 mesh.
- Also grinds gypsum, barytes, ores and other friable materials.

Ask for Bulletin K-2.

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Florida Pebble Phosphate Rock • Superphosphate
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All grades of Complete Fertilizers • Keystone® Gelatin
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Sulphuric Acid • Phosphoric Acid and Phosphates
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OUTSTANDING FEATURES

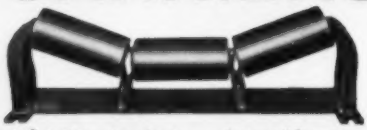
Highlighted are the features combined in S-A Quality Engineered Carriers. S-A Carriers give you more quality engineered features than any other carrier on the market today! Your assurance of long-lasting, dependable conveying efficiency.

STEPHENS-ADAMSON

Quality Engineered CARRIERS

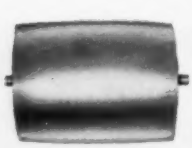
Maximum conveying efficiency and profitable bulk handling over the belt depends on what's under the belt in quality-engineered conveyor components. No single component has a greater bearing on conveyor performance than the carriers, carrying the load. The combination of features you see highlighted in the cutaway view above, are available in no other carrier on the market. The result is smooth performance, simplified and reduced maintenance, longer carrier life and less handling cost per ton. STEPHENS-ADAMSON Carriers are available in a wide range of sizes in both ball and roller bearing carriers . . . stocked for immediate delivery.

WRITE FOR CARRIER BULLETIN 355
WRITE FOR PULLEY BULLETIN 558



20° Ball Bearing Carriers—designed for years of service under rugged operating conditions.

Rubber Disc or Pneumatic "Impact" Carriers for use under loading spouts in belt or shuttle conveyors, or feeders to cushion the lumps.



"Curve Crown" Pulleys — S-A exclusive CURVE CROWN PULLEY design and SQUEEZELOCK HUB assure maximum belt training effect, gripping power for full torque transmission, minimum belt stretch and wear.

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ENGINEERED BULK HANDLING SYSTEMS
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SPEEDWALK® PASSENGER CONVEYORS
SEALMASTER® BALL BEARING UNITS
SPHERCO® BEARINGS & ROD ENDS

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For production of high and ultra-high analysis fertilizers which cannot be produced with conventional materials.

The Country's Largest and most Dependable Source of Phosphate Products for High Analysis Formulations!

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TAMPA, FLORIDA

Division

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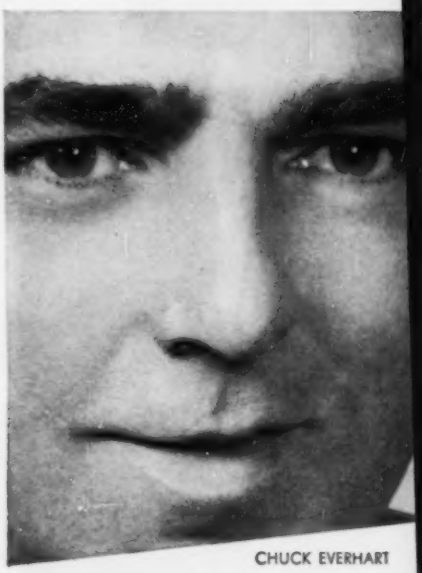

CHUCK EVERHART

These men help you get the most ...from U.S.I. fertilizer raw materials

TOM MARTIN

There's nothing more impersonal than a tank car sitting on a siding. But if it's a U.S.I. shipment on your siding, you'll find there's nothing impersonal about the service behind the U.S.I. oval. One call can bring a U.S.I. Technical Service Man to your plant . . . promptly. It may be Tom Martin, for instance, or Charles (Chuck) Everhart.

Chances are you know Tom, U.S.I.'s senior field service engineer in your area. Just about every fertilizer manufacturer does, since Tom's an oldtimer in the business... was a fertilizer plant manager himself. Tom knows our products . . . knows your products as well . . . combines this knowledge to your benefit.

Chuck is a long-time fertilizer man too . . . was also a fertilizer plant manager before coming to U.S.I. Chuck is an outgoing guy who likes people, likes working with them on their problems. And there are few problems in the fertilizer field he hasn't tackled at some time.

Tom and Chuck's definition of technical service is as broad as their experience. They'll help on shipping, equipment, unloading and storage problems, any aspect of production involving our chemicals—formulations, equipment recommendations, methods, start-up runs, costs. There's nothing cut-and-dried about their approach either. You'll find they'll listen to your slant on things . . . will be glad to exchange ideas with you.

These men work for you more than they work for us. Try them out if you have any problems on your next shipment of fertilizer raw materials—ammonia, nitrogen solutions, sulfuric or phosphoric acid.

U.S.I. INDUSTRIAL CHEMICALS CO.
Division of National Distillers and Chemical Corp.
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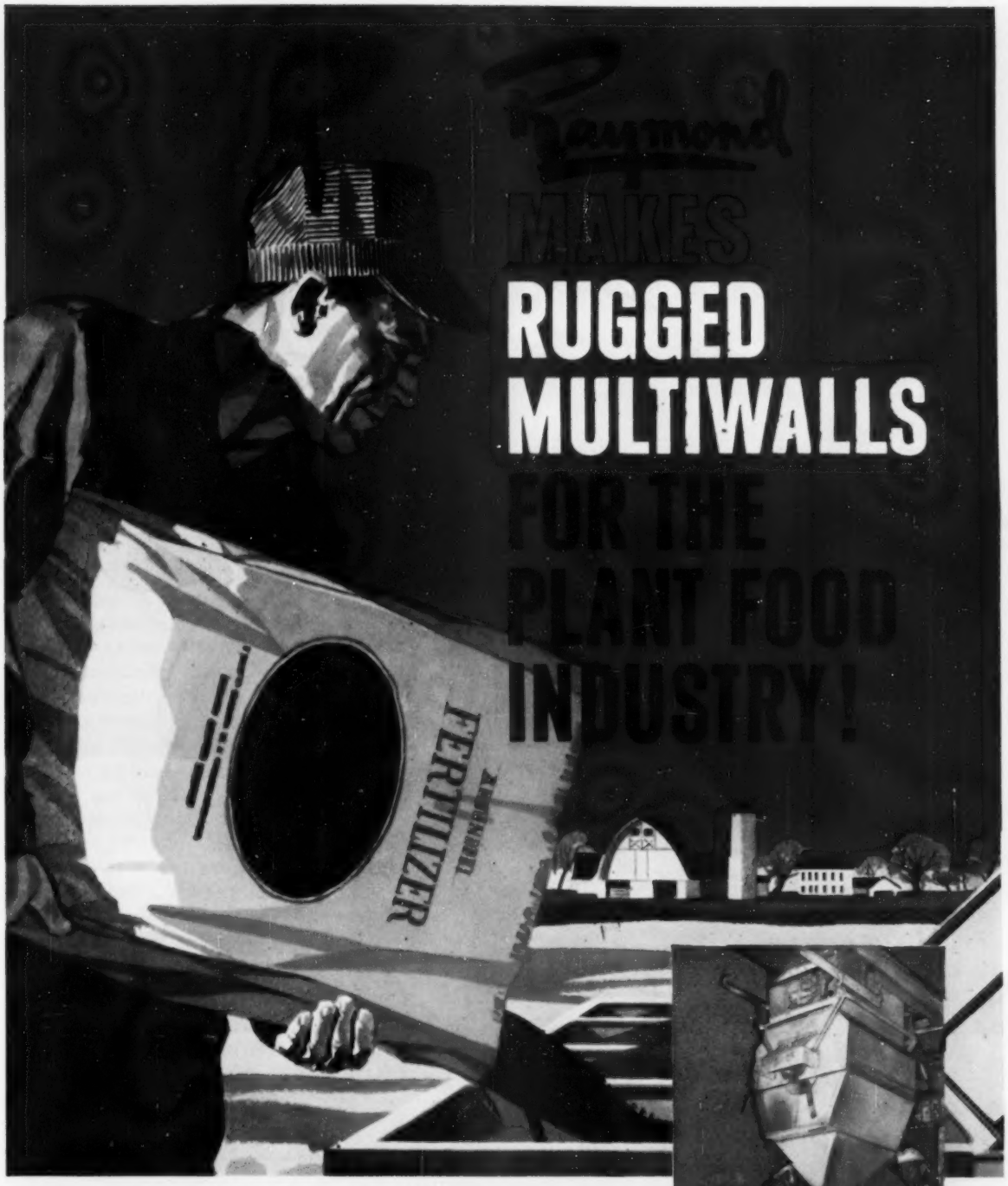
AMMONIA • NITROGEN SOLUTIONS • SULFURIC ACID • PHOSPHORIC ACID



RUGGED MULTIWALLS AND RAYMOND SERVICE benefit every phase of your operation. Whether you need help on delivery . . . design . . . extensible papers . . . printing . . . skid-proofing . . . engineering . . . or special problems, check with a Raymond representative—his wide experience in multiwall packaging can save you money. Why not contact him now?

Raymond BAG CORPORATION

Middletown, Ohio • A Division of Albemarle Paper Mfg. Co.

Atlanta • Baltimore • Chicago • Kansas City • Louisville • New York

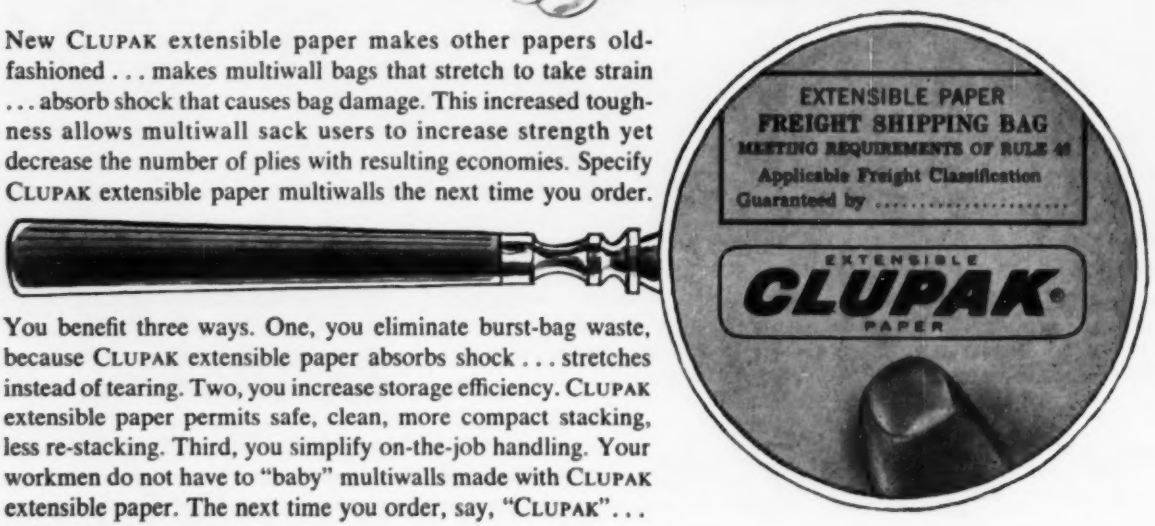
"Maker of RUGGED MULTIWALL PACKAGING for Industry"

RAYMOND ROTOMATIC BAG PACKER

Here's speed, accuracy and low-cost maintenance in packing free or semi-free flowing materials in open mouth bags. No outside electricity or compressed air required. Get specifications and details from your Raymond representative or write direct to Raymond Bag Corp., Middletown, Ohio.

ELEMENTARY...IT'S A EXTENSIBLE CLUPAK® PAPER* MULTIWALL BAG ...THAT'S WHY IT WON'T BREAK!

New CLUPAK extensible paper makes other papers old-fashioned . . . makes multiwall bags that stretch to take strain . . . absorb shock that causes bag damage. This increased toughness allows multiwall sack users to increase strength yet decrease the number of plies with resulting economies. Specify CLUPAK extensible paper multiwalls the next time you order.



You benefit three ways. One, you eliminate burst-bag waste, because CLUPAK extensible paper absorbs shock . . . stretches instead of tearing. Two, you increase storage efficiency. CLUPAK extensible paper permits safe, clean, more compact stacking, less re-stacking. Third, you simplify on-the-job handling. Your workmen do not have to "baby" multiwalls made with CLUPAK extensible paper. The next time you order, say, "CLUPAK"... before you say paper.

*Clupak, Inc.'s trademark for extensible paper manufactured under its authority and satisfying its specifications. Clupak, Inc., 530 5th Ave., N. Y. 36, N. Y.

HIS BUSINESS IS MAKING YOUR BUSINESS BETTER

Like all the men and women in Cyanamid's phosphate operation, his only business is phosphates for your mixed fertilizers

He's one of several hundred Cyanamid people who mine, process, research, deliver and service phosphatic materials for your acidulation and mixed fertilizer business. These people put Cyanamid's more than 40 years of phosphate experience into products and services you can use.

Services you can use

Traffic Service: Cyanamid traffic specialists are ready to route and ship your orders without delays. Their knowledge can save you money and can make your operation run even more efficiently.

Technical Service: Cyanamid's staff of technical experts are on 24-hour alert. Often, what are new problems to you are solved problems to them. Make your formulation and production problems theirs. That's their job.

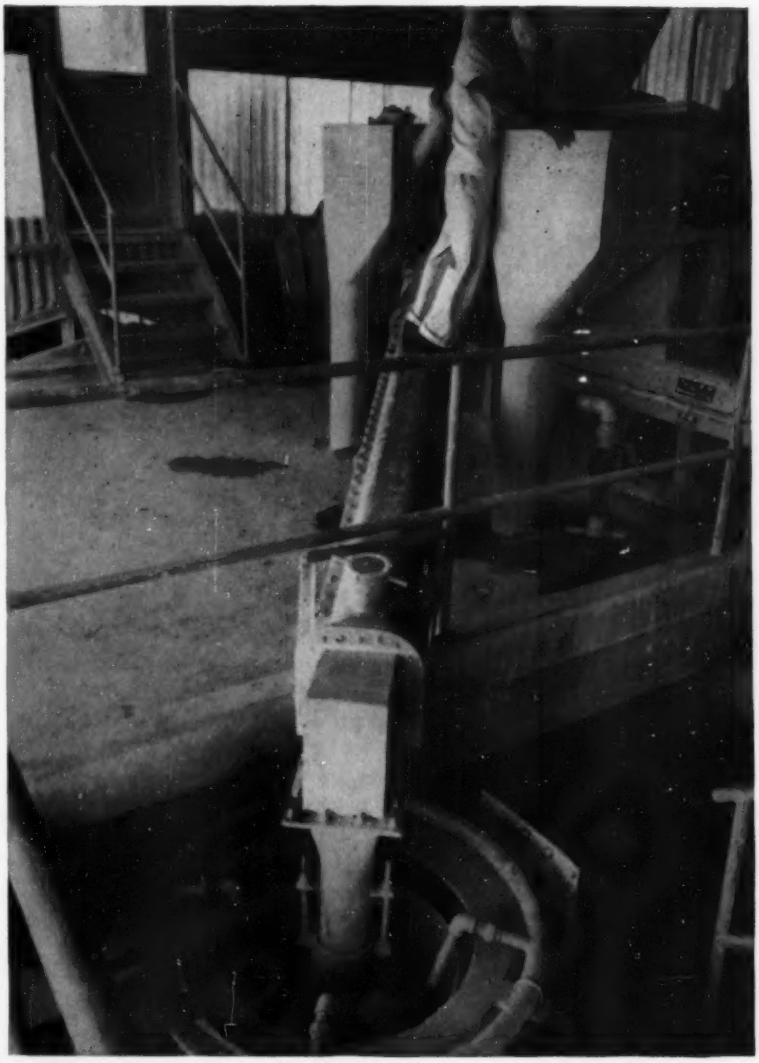
Sales Service: Cyanamid sales representatives are available to work with and for you in expanding present markets or in establishing new markets.

Products you can use

Cyanamid's only phosphate business is manufacturing the highest quality products for your mixed fertilizer requirements.

- Florida Natural Phosphate Rock.
- TREBO-PHOS® — Triple Superphosphate.
- Phosphoric acid for acidulation.

American Cyanamid Company, Agricultural Division, N. Y. 20, N. Y. *®TREBO-PHOS is American Cyanamid Company's trademark for its triple superphosphate.*



This Cyanamid technician is checking the flow and quality of phosphate rock just before it goes into the cone where it is mixed with phosphoric acid to make Trebo-Phos Triple Superphosphate.

CYANAMID

PHOSPHATE PRODUCTS

CYANAMID SERVES THE MAN WHO MAKES A BUSINESS OF AGRICULTURE

ASSOCIATION ACTIVITIES

CFA Meets November 13-15

The California Fertilizer Association has announced the program of its 37th Annual Convention, to be held at the del Coronado Hotel, Coronado, on November 13-14-15.

Featured speakers will be Tyler Macdonald, senior vice president, Hixon & Jorgensen, Inc., Los Angeles, and Leon V. Tichinin, Santa Clara Agricultural Extension Service, University of California, San Jose.

Mr. Macdonald, an authority on sales technique and market development, will address the business session on the subject "The New Look in Selling."

Mr. Tichinin will speak following the business luncheon on "What I Learned From 20,000 Russians in Moscow." He was one of two Russian-speaking experts on American agriculture to go to the American National Exhibition in Moscow during the summer of 1959. He was there during the 42 day period of the exhibition, and talked privately with many people from all parts of the Soviet Union, visiting in the homes of a number of them.

The program has been developed so as to insure that it won't be all work and no leisure. The ladies will enjoy a social hour as guests of the Association, and will have a choice of competition in bridge, canasta, golf, putting, and a mixed bowling tournament.

The men will have the choice of a golf tournament and the mixed bowling tournament. Prizes will be awarded to winners in all competition.

The annual Banquet will feature dinner dancing on the last evening of the Convention.

Mr. Scoville urged all fertilizer sales and management people to attend, pointing out that this is the one big opportunity each year in the west to meet informally with contemporaries in the industry. Inquiries should be addressed to the California Fertilizer Association at 719 K Street, Sacramento 14, California.

A Renneburg Continuous Combination Ammoniator-Granulator, a Renneburg DehydrO-Mat Dryer with special refractoryless gas-fired furnace, and a Renneburg Straight Shell Cooler . . . being installed in a 30-ton-per-hour granular plant of one of the leading mid-western fertilizer producers.

RENNEBURG CONTINUOUS COMBINATION AMMONIATOR-GRANULATOR

This rugged and highly-versatile unit is being used for government research work and experimentation in plant size quantities.

Other chemical and fertilizer processing equipment manufactured by Renneburg includes: • Ammoniators • Granulators • Dryer Furnaces • Complete Air Handling Systems • Pilot Plants • DehydrO-Mat Combination Dryers and Coolers

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Pioneers in the Manufacture and Development of Processing Equipment for over 80 years.

Canadians Elect CIL's Thomson

J. W. Thomson, sales manager of the agricultural chemicals division of Canadian Industries Limited, was elected president of the Canadian Fertilizer Association at the annual meeting of the organization at Murray Bay, Que.

Thomson

Other officers elected for the 1960-61 season were 1st vice-president—William Houde of William Houde Limited, Laprairie, Que.; 2nd vice president—G. H. Johnson of Swift Canadian, Toronto; secretary-treasurer — R. P. Pennington, Potash Company of America, Toronto; directors: A. A. Scales, Island Fertilizer Co., Charlottetown, P.E.I.; Lloyd Hanson, International Fertilizer Co., Saint John, N.B.; Delbert Dupre, Canada Packers, Toronto; Fraser Ross, Canadian Industries Limited, Halifax; Alex Mooney, Canada Packers, Toronto; Donald Moffatt, United Co-operative of Ontario, Toronto; and J. C. Read, Read Fertilizers Limited, Elmira, Ont.

(Associations continued on page 23)

Arcadian® News

Volume 5 | For Manufacturers of Mixed Fertilizers | Number 10

CASH IN ON THE TREND TO N

Put More N in N-P-K

Tests show that high-nitrogen fertilizers produce big yields.

The stage is set for greater profits in manufacturing and selling mixed fertilizers. Farm crop needs, experiment station recommendations and fertilizer plant experience all point the way—to more N in N-P-K!

Farmers and crop experts alike agree that practically all of our leading crops need more nitrogen than any other plant food. And on a majority of soils, a high-nitrogen mixed fertilizer can supply all the plant foods needed in one trip across the field. Sales figures show that most of the tonnage of mixed fertilizer sold is lower in nitrogen than the needs of the crops on which the fertilizer is used. And, though side-dressing nitrogen has increased fast, even this additional nitrogen has not brought the total volume of nitrogen into balanced ratio with other plant foods.

Habits Can Change

On the other hand, progressive farmers everywhere have been accepting the 2-1-1, 3-2-2 and 1-1-1 ratio fertilizers as fast as manufacturers have made them available. For speed and ease of application, they have changed to 16-8-8 instead of 10-5-5; 13-13-13 instead of 6-6-6; and other higher-analysis mixtures in place of fertilizers having the same ratio but lower plant food content. When 15-10-10, 12-6-6, 16-4-8, 12-12-12, 15-15-15 and other high-nitrogen, high-analysis fertilizers have been offered, they have met with demand among leading farmers.

Some of these leading farmers have been ahead

(continued on following page)

(continued from preceding page)

of the colleges and industry in demanding these better and more concentrated fertilizers made in the proper ratio to meet crop needs. But now the wheel has turned. Most states are now recommending these 2-1-1, 3-2-2 and 1-1-1 ratio fertilizers in concentrated form. Thousands of field and plot tests by experiment stations, farmers and dealers have shown that these new fertilizers help farmers make more money with less work.

The situation looks complicated, but is basically simple. Farmers who used to apply 100 or 200 pounds of fertilizer per acre have found that it pays to use 400, 500 or even 1,000 pounds of the same analysis per acre. Their logical next step has been to find that this same large amount of plant food in more concentrated fertilizer pays even better. It saves the farmer labor, freight, time and cash.

Wake Up the Laggards

Now that the leaders have accepted and proved the value of high-nitrogen, high-analysis mixed fertilizers, this is the ideal time to sell other farmers on the same practical method of getting higher yields and profits. It pays to tell 'em in every way you can.

More N—More Profit

Obviously, this calls for greater production of high-nitrogen, concentrated mixed fertilizers. And, there is money in this for you. You save many ways, and you profit many ways, by producing high-N fertilizers.

1. By selling more nitrogen in mixed fertilizer you can get more profit per pound of nitrogen sold.
2. You get more of the total fertilizer market by selling more N in N-P-K.
3. You cut your costs other ways—less freight, less storage, less handling, fewer items to inventory per unit of dollar sales.
4. You get greater dollar volume through your plant producing high-nitrogen mixed fertilizers.
5. You keep ahead of your customers—and improve your reputation for supplying fertilizers that make money for farmers—because every bag supplies what the crops need.

Yes, the year ahead is a good time to take advantage of the growing enthusiasm for more N in N-P-K. Don't get behind your customers in the high-N parade—get your customers behind you. Start now to put more N in N-P-K and *More Money in Making Fertilizer!*

KEEP SALESMEN *PRODUCING* DURING THE OFF-SEASON

Fertilizer manufacturers have been known to remark that the industry would be better off if all salesmen were "off the road" between seasons. During such periods, farmers and dealers are usually more interested in beating down prices than in placing orders. They talk convincingly—and usually with exaggeration—about the "deals offered by competition." All too often salesmen, over-anxious to move material, end up by being induced to undermine their own price structure!

The moral is clear. Don't let your salesmen and dealers become mere "listening posts" in the off-season. Tell them to avoid entering into premature price negotiations with accounts that are merely "window shopping."

Take Positive Action

The best way to handle the chronic off-season problem is to plan to keep your salesmen and dealers busy with constructive activity during fall and winter months. Here's a list of off-season projects. Check this list for ideas. You may be surprised at how much you can do to make slack time more profitable.

OFF-SEASON PROJECTS FOR PROFIT

- ☐ Document testimonials, photos and yield response to last season's fertilizer application for use in future sales promotion.
- ☐ Design and install dealer identification signs and decals.
- ☐ Do some customer entertaining where it is necessary to get better acquainted or show appreciation to a big account.
- ☐ Survey your weak spots with an eye toward new prospects.
- ☐ Build good-will with agricultural officials and people in related fields who can influence fertilizer use.
- ☐ Review transportation methods for ways to improve service and cut costs.
- ☐ Promote needed application equipment in your market areas.
- ☐ Look for specialized applications which might offer an untapped market for your products.
- ☐ Correct and build up mailing lists.
- ☐ Plan next season's advertising program and the best methods for getting dealers to tie in.
- ☐ Hold meetings and field days with farmers and dealers.
- ☐ Organize your soil testing program.
- ☐ Conduct training sessions on selling techniques for your salesmen.
- ☐ Plan to introduce new high-nitrogen grades which mean more profit for you and better results for your customers.

Arcadian News for Fertilizer Manufacturers . . . . . from NITROGEN DIVISION

Do Your Men Know How To Handle Your Equipment?

Getting plant personnel to operate and maintain equipment efficiently and economically is a serious problem to many fertilizer manufacturers. Ignorant and reckless handling of equipment can cause low output, costly break-downs, expensive repairs and production delays.

When one leading fertilizer manufacturer discovered that this condition was increasing his overhead and reducing his profits, he decided to do something about it. He called on a Nitrogen Division technical service man for assistance. Working together, they found a practical way to solve the problem.

Investigation showed that the men who worked with the equipment every day simply did not know enough about it to handle it properly. They needed training in operation and upkeep.

Operation and Maintenance Clinic

To obtain this training quickly and economically, it was decided to hold a clinic to be attended by key personnel from the fertilizer manufacturer's plants and invited representatives of the companies that made the equipment used in the plants.

Prior to the conference, the fertilizer men canvassed their co-workers and developed a list of pertinent questions. The equipment manufacturers came prepared to answer the questions and to demonstrate proper operation and maintenance. During the clinic, the men had full view of the equipment discussed and were able to disassemble various parts for clearer understanding.

For the fertilizer manufacturer, the result of the two-day clinic has been bigger production, lower overhead and better profits through a marked improvement in the use and the upkeep of the equipment in his plants. For the equipment manufacturers, the clinic was an opportunity to build better customer relations and to learn more about the problems that arise in actual use of the equipment they make and sell.

SOIL TESTS *NOW* CAN BE SALES-MAKERS FOR YOU

The biggest service you can perform for most of your farmer customers right now is to encourage them to test their soils. Help them to get the real facts on the plant foods their soils need to produce profitable crops and you're on sound ground to build bigger sales and customer satisfaction.

Soil tests show what the land needs. Lime, phosphorus, potash and organic matter or nitrogen levels are all important to the success of the next crop. When a farmer gets a soil test report, he's taken his first big step in planning a practical fertilizer program. And he is a hot prospect for some of the specific fertilizers you stock.

A soil test helps you get down to cases fast in selling. And when your dealers promote soil tests in the fall, you get a chance to sell fall fertilizers as well as spring fertilizers. Surveys in many areas show that farmers who use soil tests are way ahead of their neighbors in amount of fertilizer used.

Test Often

Some farmers run a soil test every third or fourth or fifth year. But when they change their rotation or crop plan, or feel the need to change their production goals to aim for higher yields, an immediate soil test is important. It takes the guesswork out of planning how to make more fertilizer produce more profit. Compared to the old shotgun approach of using the handiest, or cheapest, fertilizer mixture, the soil test is the rifle that enables farmers to shoot accurately for high yields. And farmers who continue to make money become loyal customers.

Dealer Promotion

Several systems of getting soil samples work well for dealers: (1) The farmer collects samples following directions of extension service or dealer. (2) The salesman collects soil samples. This works best if the farmer goes along. (3) The dealer hires a man to take samples, as agreed to previously by the farmer. (4) Special soil test drives, with extension service, dealers, and vo-ag or 4-H members cooperating, get a large percentage of fields tested for an area.

When the dealer pays for farm soil tests, he can automatically get a copy of the test report, and can easily help the farmer analyze his fertilizer needs. Many farmers, especially those new to soil testing, like to have someone consult with them on soil test recommendations appearing on the report. This also enables the dealer to point out that average recommendations may not be high enough for the most profitable yields. The proper proportion of plant foods, with larger quantities per acre, are often the better money-maker.

Plan a soil test program now. It's the top opportunity of the season to get new customers and to make old customers bigger buyers of your fertilizer.

Arcadian® NITROGEN SOLUTIONS

	CHEMICAL COMPOSITION %						PHYSICAL PROPERTIES		
	Total Nitrogen	Anhydrous Ammonia	Ammonium Nitrate	Urea	Water	Neutralizing Ammonia Per Unit of Total N (lbs.)	Approx. Sp. Grav. at 60° F	Approx. Vap. Press. at 104° F per Sq. In. Gauge	Approx. Temp. at Which Salt Begins to Crystallize °F
NITRANA®									
2	41.0	22.2	65.0	—	12.8	10.8	1.137	10	21
2M	44.0	23.8	69.8	—	6.4	10.8	1.147	18	15
3	41.0	26.3	55.5	—	18.2	12.8	1.079	17	-25
3M	44.0	28.0	60.0	—	12.0	12.7	1.083	25	-36
3MC	47.0	29.7	64.5	—	5.8	12.6	1.089	34	-30
4	37.0	16.6	66.8	—	16.6	8.9	1.184	1	56
4M	41.0	19.0	72.5	—	8.5	9.2	1.194	7	61
6	49.0	34.0	60.0	—	6.0	13.9	1.050	48	-52
7	45.0	25.3	69.2	—	5.5	11.2	1.134	22	1
URANA®									
6C	43.0	20.0	68.0	6.0	6.0	9.3	1.180	12	39
6M	44.0	22.0	66.0	6.0	6.0	10.0	1.158	17	14
10	44.4	24.5	56.0	10.0	9.5	11.0	1.114	22	-15
11	41.0	19.0	58.0	11.0	12.0	9.2	1.162	10	7
12	44.4	26.0	50.0	12.0	12.0	11.7	1.087	25	- 7
13	49.0	33.0	45.1	13.0	8.9	13.5	1.033	51	-17
DURANA®									
DURANA is a trade-mark of Allied Chemical Corporation.	37.0	13.3	53.4	15.9	9.4	7.2	1.235	0	36
U-A-S®									
A	45.4	36.8	—	32.5	30.7	16.2	0.932	57	16
B	45.3	30.6	—	43.1	26.3	13.5	0.978	48	46
[illegible]	82.2	99.9	—	—	—	24.3	0.618	211	-108

*DURANA contains 8% formaldehyde.

Other ARCADIAN® Products: URAN® and FERAN® Solutions • Ammonia Liquor • N-dure® A-N-L® • Ammonium Nitrate • UREA 45 • Nitrate of Soda • Sulphate of Ammonia

When you purchase your nitrogen requirements from Nitrogen Division, Allied Chemical, you have many different nitrogen solutions from which to select those best suited to your ammoniation methods and equipment. You are served by America's leading producer of the most complete line of nitrogen products on the market. You get formulation assistance and technical help on manufacturing problems from the Nitrogen Division technical service staff. You benefit from millions of tons of nitrogen experience and the enterprising research that originated and developed nitrogen solutions.

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Midwest Meeting

The dates of the Midwest Industry-Agronomists meeting will be February 16 and 17, 1961 at the Edgewater Beach Hotel, Chicago. Research and extension agronomists will gather in Chicago several days earlier for sessions of the North Central Soils Research Committee, the Midwest agronomists and the extension men. A good many industry men will probably be arriving in Chicago on February 15, to get set for the joint meeting.

For information on program, lodging, etc., please contact G. L. Terman, Chemical Engineering Building, TVA, Wilson Dam, Alabama.

ASSOCIATION BRIEFS

August 15: The seventh International Soil Science Congress, at the University of Wisconsin, addressed by the director general of the UN Food and Agriculture Organization, were asked to work for the elimination of hunger in the world. On the other hand, Dr. Richard Bradfield wants to "put a brake on population growth." He is chairman of Cornell's agronomy department.

• • •

November 21: The annual meeting of the South Carolina Plant Food Educational Society will be held November 21 at the Clemson House, Clemson, S. C.

• • •

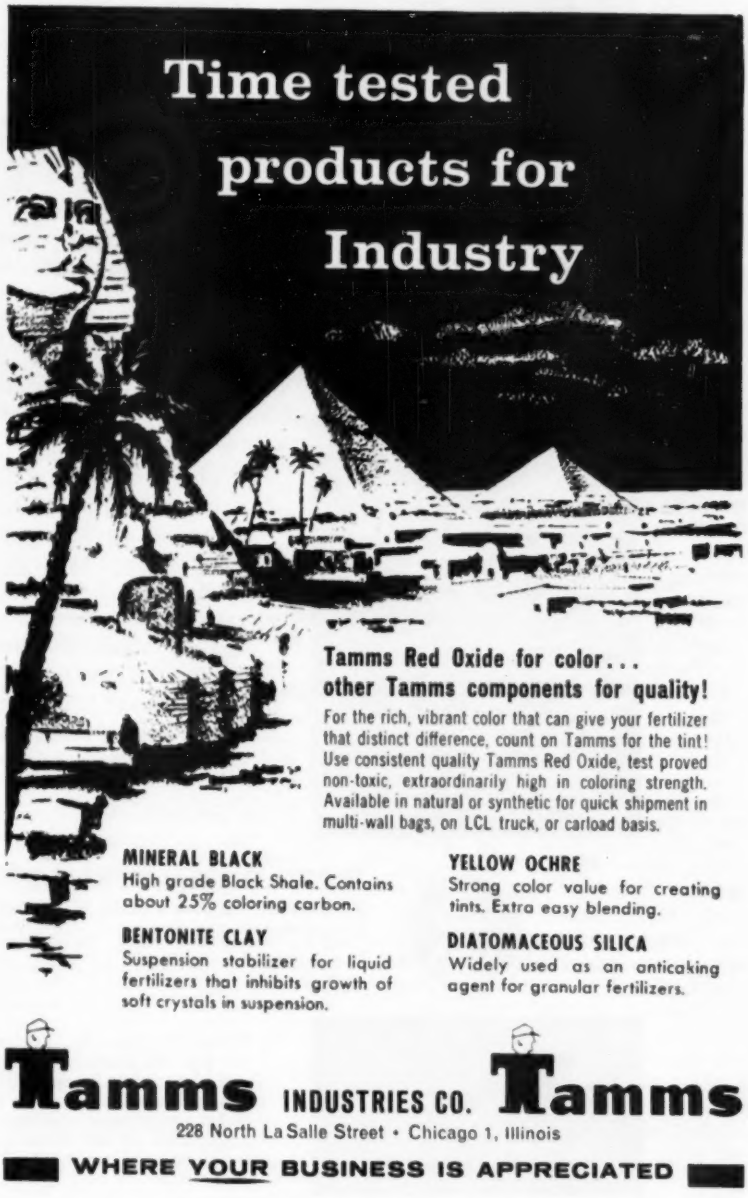
January 25-26: The Southern Regional Soil Resarch Committee's fertilizer evaluation work group and TVA will jointly sponsor a symposium on "Effects of Environment on Crop Response to Fertilizers" at Muscle Shoals, Alabama, on January 25 and 26, 1961. This symposium will be held in connection with the annual fertilizer evaluation conference sponsored by these groups and will occupy the morning sessions on both days. The first session will be concerned with moisture-yield response relationships. The second morning session will include topics concerning temperature effects on nutrient uptake. Arrangements are being made for outstanding speakers for various papers to be presented in the symposium.

Afternoon sessions will be devoted to progress reports of cooperative research, concerning only the sponsoring groups and cooperating states. Tours of TVA's research and production facilities will be available for all in attendance.

Scientists and commercial representatives interested in research in these fields are invited to attend.

(Extension Service Photo)

New officers of the Mississippi Soil Fertility and Plant Food Council were elected at the end of the first annual meeting in Biloxi, August 25-27. They are (from the left) Mike R. Blouin, Jr. of Columbus, president; W. F. "Bill" Harris of Jackson, vice-president; W. L. Ashley of Jackson, secretary-treasurer, and H. S. "Bill" Gordon, Jr. of Jackson, retiring president.


Time tested
products for
Industry
Tamms Red Oxide for color...
other Tamms components for quality!
For the rich, vibrant color that can give your fertilizer that distinct difference, count on Tamms for the tint! Use consistent quality Tamms Red Oxide, test proved non-toxic, extraordinarily high in coloring strength. Available in natural or synthetic for quick shipment in multi-wall bags, on LCL truck, or carload basis.
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High grade Black Shale. Contains about 25% coloring carbon.
BENTONITE CLAY
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Radiating out from Cincinnati

This is the first of the TGS Terminal Molten Sulphur Truck and Rail Distribution Stations being set up to serve industrial areas of the country. Regular large tonnage barge shipments of Molten Sulphur from our mines in the Gulf area are keeping this Cincinnati Terminal well-stocked to meet the growing demand for Molten Sulphur in the Ohio River area.

Additional Molten as well as Solid Sulphur terminals are being considered for other parts of the country.

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Sulphur Producing Units: Newgulf, Texas - Spindletop, Texas - Moss Bluff, Texas - Fannett, Texas - Worland, Wyoming - Okotoks, Alberta, Canada.

Molten Sulphur in tank *cars* can be delivered to any point in the States or Canada from our nearest mine or recovery plant. Barge deliveries of Molten Sulphur are available on all navigable inland waters. Solid Sulphur, as for many years, is deliverable all over the world. Large inventories at our mines assure industry it will get its supplies when needed.

Consumption of Commercial Fertilizers and Primary Plant Nutrients in the United States, year ended June 30, 1959

by
WALTER SCHOLL, MARION M. DAVIS, AND CAROLINE A. WILKER
Fertilizer Investigations Research Branch
Soil and Water Conservation Research Division
Agricultural Research Service
U. S. Department of Agriculture
Beltsville, Maryland

Consumption of fertilizers and primary plant nutrients (N, P_2O_5, K_2O) are reported for individual States including Hawaii, the District of Columbia, and Puerto Rico, for the year ended June 30, 1959. Only incomplete data were available for Alaska and the Virgin Islands for this period and are not included in the quantities cited in this report. However, fertilizers known to have entered Alaska and the Virgin Islands in 1958 totaled 2,838 tons and 888 tons, respectively. Presumably these tonnages approximate all commercial fertilizer consumed in these areas.

Information was obtained from (1) manufacturers on the tonnage of each kind and grade of product shipped to agents, dealers, and consumers, (2) distributors and custom applicators of anhydrous ammonia and nitrogen solutions, (3) fertilizer brokers, and (4) tonnage reports issued by the respective States. Data for California, Florida, Massachusetts, Missouri, North Carolina, South Carolina, Texas, and Virginia, however, were obtained chiefly from the State tonnage reports.

The tonnages of fertilizer reported as mixtures and materials include all forms (bagged, blends, bulk, customer mix, granular, liquid, pesticide mixes, pulverized) marketed by the respondents indicated above. The tonnages of bulk blends marketed by dealers and applicators are not included as such. But the quantities of products (mixtures and materials) used for blending by dealers and applicators are included in the reports of respondents who supplied the products.

The quantities of N, P_2O_5, and K_2O are based on the average analyses of samples of the products as reported by fertilizer-control officials of the respective State in which they were marketed, rather than on the manufacturers' guarantees. Thus, the overruns or underruns of nutrients are taken into account.

Quantities are reported as 2,000-pound tons. Although the data refer to shipments, the terms "consumption," "sales," and "shipments" are used synonymously. Actually consumption undoubtedly differs slightly from either shipments or sales.

Table 2.—Change in fertilizer consumption in regions and United States, year ended June 30, 1959

Region	Increase or decrease (—) from year ended June 30, 1958					
	Mixtures	Materials[1]	Total[1]	Mixtures	Materials[1]	Total[1]
	Tons	Tons	Tons	Percent	Percent	Percent
New England	6,741	— 2,287	4,454	1.8	— 3.2	1.0
Middle Atlantic	87,718	12,963	100,681	5.1	6.5	5.2
South Atlantic	544,277	154,894	699,171	11.8	16.3	12.6
East North Central	306,601	101,635	408,236	9.2	7.5	8.7
West North Central	349,863	281,351	631,214	29.1	25.4	27.3
East South Central	283,064	67,866	350,930	15.8	8.3	13.4
West South Central	59,889	49,775	109,664	9.5	7.1	8.2
Mountain	4,374	22,277	26,651	6.3	5.1	5.3
Pacific	36,526	107,572	144,098	9.7	7.4	7.8
Total	**1,679,053**	**796,046**	**2,475,099**	**11.9**	**11.2**	**11.7**
Hawaii	— 5,710	20,895	15,185	— 9.5	35.0	12.7
Puerto Rico	42,661	— 19,512	23,149	23.5	—36.9	9.9
United States	**1,716,004**	**797,429**	**2,513,433**	**12.0**	**11.0**	**11.7**

[1] Excludes quantities of secondary and trace nutrient materials for direct application.

All Fertilizers

The total quantity of fertilizer consumed in the year ended June 30, 1959, was 25,312,672 tons (table 1). It comprises 24,089,468 tons of products containing one or more of the primary nutrients and 1,223,204 tons of secondary and trace nutrient materials. Consumption of fertilizers containing primary nutrients was 2,513,433 tons (11.7 percent) more than (21,576,035 tons) in 1957-58. The quantity of the secondary and trace nutrient materials was 283,476 tons (30.2 percent) more than the 939,728 tons used in the preceding year.

Changes in the consumption of primary-nutrient fertilizers between 1957-58 and 1958-59 are summarized, by regions, in table 2. The increase in total consumption in 1958-59 was due to substantial increases in both mixtures (1,716,004 tons, 12.0 percent) and in direct-application materials (797,429 tons, 11.0 percent). Consumption of both classes of fertilizers increased in most regions. However, the total increased use in the West North Central, East South Central and South Atlantic regions and in Hawaii each exceeded the national increase of 11.7 percent.

Although the national increase in consumption of primary-nutrient fertilizers was substantially higher than for any previous year, as shown in table 3 (column 9), decreases or no change occurred in nine of the 51 areas indicated. In comparison with 1957-58, increases were as high as 47 percent (Kansas), whereas the maximum decreases was seven percent (Utah). In the areas showing increases 2,545,403 tons (12.9 percent) more fertilizer was consumed, whereas in the areas showing decreases consumption declined 31,970 tons (1.7 percent)—resulting in a net increase of 2,513,433 tons (11.7 percent).

Compared with 1957-58, the consumption of mixtures in 1958-59 increased by 373,843 tons (10.9 percent) in the July-December period and by 1,342,161 tons (12.3 percent) in the January-June period. Consumption of primary-nutrient materials for direct application also was higher by 123,497 tons (4.9 percent) and 673,932 tons (14.4 percent) in these periods, respectively. The percentage increase of mixtures was nearly the same for each six-month period whereas that of materials was almost three times as high in January-June as in the July-December period.

Table 1.—Kinds of fertilizers consumed in regions and United States, year ended June 30, 1959[1]

Tons

Kind	New England	Middle Atlantic	South Atlantic	Central East North	West North Central	East South Central	West South Central	Mountain	Pacific	Hawaii and Puerto Rico	United States
MIXTURES	**373,619**	**1,815,887**	**5,160,196**	**3,632,495**	**1,552,608**	**2,078,604**	**691,316**	**73,524**	**412,144**	**278,634**	**16,069,027**
N-P-K	349,058	1,703,292	4,703,908	3,349,324	1,301,192	1,864,892	616,748	38,323	309,362	247,175	14,483,274
N-P	64	648	1,207	64,527	172,463	9,896	35,399	35,120	97,782	1,024	418,130
P-K	24,497	111,836	209,953	218,424	78,884	198,768	37,545	58	2,462	5,895	888,322
N-K	0	111	245,128	220	69	5,048	1,624	23	2,538	24,540	279,301
CHEMICAL NITROGEN MATERIALS	**11,738**	**78,224**	**880,163**	**493,407**	**687,155**	**581,105**	**473,426**	**252,838**	**951,928**	**83,820**	**4,493,804**
Ammonia, anhydrous	0	3,023	28,472	87,883	168,549	60,531	145,854	45,515	140,462	784	681,073
Ammonia, aqua	0	2	0	11,497	14,427	4,939	6,794	29,862	366,185	49,112	482,818
Ammonium nitrate[2]	5,167	34,722	156,025	161,835	331,880	290,662	121,903	76,460	94,143	0	1,272,797
Ammonium nitrate-limestone mixtures	58	1,385	263,135	455	30	38,216	2,543	214	315	0	306,351
Ammonium sulfate	440	7,093	8,422	113,517	9,598	13,911	82,154	59,053	227,763	27,994	549,945
Calcium cyanamide	651	6,957	9,373	812	0	7,130	7,992	606	7,317	0	40,838
Calcium nitrate	12	3	11,508	140	0	1,178	446	8,183	30,854	102	52,426
Nitrogen solutions	1,483	6,006	138,085	94,343	156,530	14,739	24,779	13,525	54,950	0	504,440
Sodium nitrate	1,717	11,648	260,438	1,197	394	146,143	57,201	302	213	121	479,374
Urea	1,580	4,966	2,868	17,998	4,967	3,543	23,180	17,626	27,748	5,700	110,176
Other	630	2,419	1,837	3,730	780	113	580	1,492	1,978	7	13,566
NATURAL ORGANIC MATERIALS	**25,017**	**40,938**	**31,083**	**51,728**	**19,286**	**2,828**	**6,855**	**5,915**	**334,145**	**153**	**517,948**
Blood, dried	15	115	20	0	0	0	0	45	2,316	0	2,511
Castor pomace	1,578	135	4,181	0	0	0	0	0	2,023	0	7,917
Compost[3]	166	1,052	562	7,669	8,421	186	1,626	86	37	0	19,805
Cottonseed meal[3]	2,371	84	2,180	0	0	27	0	0	96	0	4,758
Fish scrap, meal, emulsions	315	28	6	0	0	0	0	94	1,271	0	1,714
Manures, dried	8,715	16,466	6,264	9,061	3,725	1,267	3,321	1,883	271,148	1	321,851
Sewage sludge, activated	8,050	14,670	8,680	34,258	7,130	1,319	1,897	3,131	17,044	150	96,329
Sewage sludge, other	0	0	139	124	0	6	0	36	33,564	0	33,869
Tankage, all	3,068	8,178	5,450	616	10	23	0	62	1,440	2	18,849
Other	739	210	3,601	0	0	0	11	578	5,206	0	10,345
PHOSPHATE MATERIALS	**28,937**	**84,234**	**104,365**	**699,408**	**631,810**	**246,584**	**235,330**	**195,888**	**270,116**	**17,085**	**2,513,757**
Ammonium phosphate: 11-48[4]	0	1,386	35	14,218	55,268	0	4,770	10,685	15,751	1,405	103,518
Ammonium phosphate: 13-39[4]	0	0	0	370	24,451	11	16,656	4,496	6,026	0	52,010
Ammonium phosphate sulfate: 16-20[4]	0	0	0	294	95,971	395	83,665	57,394	98,645	395	336,759
Ammonium phosphate nitrate: 27-14[4]	0	0	0	0	3,081	9	4	3,783	13,457	0	20,334
Basic slag	0	0	20,213	30	0	116,743	2,382	0	0	0	139,368
Bonemeal: raw and steamed	1,484	3,819	1,700	1,619	261	411	396	38	2,165	0	11,893
Calcium metaphosphate	0	525	2,700	3,687	22,585	14,764	320	202	31	0	44,814
Diammonium phosphate: 21-53[4]	10	210	634	4,176	5,737	2,582	1,028	9,280	1,909	1,414	26,980
Phosphoric acid	0	0	0	0	181	0	2,269	9,434	11,321	0	23,205
Phosphate rock	362	6,611	14,651	527,455	235,227	11,041	18,443	215	1,529	4,147	819,681
Collodial phosphate	0	210	4,384	1,351	3,067	7,235	1,350	0	390	0	17,987
Superphosphate: 18%	815	7,823	21,454	12,308	16,077	19,195	1,350	101	1,125	0	80,248
Superphosphate: 19%	4,384	0	4,142	463	35	52,001	9	2,295	62,908	5,428	131,665
Superphosphate: 20-22%	21,441	61,792	27,947	41,723	29,563	16,257	60,218	13,414	25,004	0	297,359
Superphosphate: 23-41%	0	0	0	2,838	707	0	449	1,227	69	856	6,146
Superphosphate: 42-44%	0	0	0	110	12,046	0	0	25,689	6,129	0	43,974
Superphosphate: 45%	2	753	56	21,772	50,158	980	9,089	47,390	21,308	0	151,508
Superphosphate: 46%	359	1,102	996	61,249	73,454	3,887	32,055	10,106	237	3,100	186,545
Superphosphate: 47-48%	0	3	4,383	4,952	3,629	778	741	17	0	0	14,503
Superphosphate: 49-54%	8	0	25	28	312	295	73	122	27	0	890
Other	72	0	1,045	765	0	0	63	0	2,085	340	4,370
POTASH MATERIALS	**2,671**	**9,240**	**90,217**	**206,660**	**51,959**	**64,019**	**39,081**	**2,826**	**15,235**	**13,024**	**494,932**
Cotton hull ashes	456	24	0	0	8	0	0	0	0	0	488
Lime-potash mixtures[5]	0	0	21,371	1	0	7,775	0	0	0	0	29,147
Manure salts	0	0	384	0	0	0	59	0	0	0	443
Potassium chloride 50%	0	0	543	1,174	0	600	1,947	62	0	0	4,326
Potassium chloride: 60%	1,871	6,275	40,086	200,140	50,504	47,437	35,240	1,474	7,030	11,198	401,255
Potassium magnesium sulfate	89	1,210	2,859	2,078	987	1,263	1,347	154	1,763	9	11,759
Potassium nitrate	126	0	101	2	0	0	0	0	2	0	231
Potassium sodium nitrate[6]	0	0	19,077	0	0	672	154	0	2	10	19,915
Potassium sulfate	128	1,659	4,648	3,131	425	6,271	7	1,136	6,428	1,807	25,640
Other	1	72	1,148	134	35	1	327	0	10	0	1,728
SECONDARY AND TRACE NUTRIENT MATERIALS	**97**	**5,990**	**121,760**	**3,332**	**686**	**5,037**	**3,904**	**30,315**	**1,049,101**	**2,982**	**1,223,204**
Aluminum sulfate[3]	0	12	7	0	0	0	0	4	16	0	39
Borax[3]	35	221	340	296	96	445	18	0	521	0	1,972
Calcium sulfate (gypsum)	15	5,016	118,947	1,604	398	4,329	997	22,572	1,006,789	0	1,160,667
Copper sulfate[3]	0	60	198	36	1	1	0	132	78	0	506
Iron sulfate[3]	0	0	103	2	23	36	7	484	1,765	2,843	5,263
Magnesium sulfate[3]	24	237	106	48	7	58	1	47	47	52	627
Magnesium sulfate[3]	0	174	44	729	8	0	0	47	40	0	1,042
Mixed minerals[3]	1	12	1,158	56	99	48	62	1,408	6,025	0	8,869
Sulfur: 25-99% S	2	47	592	90	21	4	1,289	1,955	21,208	2	25,210
Sulfuric acid: 40-93%	0	0	0	0	0	0	1,499	2,243	1,311	0	5,053
Zinc sulfate[3]	0	13	265	33	33	116	1	40	3,303	85	3,889
Other	20	198	0	438	0	0	30	1,383	7,998	0	10,067
GRAND TOTAL	**442,079**	**2,034,513**	**6,387,784**	**5,087,030**	**2,943,504**	**2,978,177**	**1,449,912**	**561,306**	**3,032,669**	**395,698**	**25,312,672**

[1] Includes the following fertilizers distributed by government agencies for test demonstrations. In mixtures, 11-30-0 grade 108 tons, 14-14-14 grade 172 tons, 30-10-0 grade 3,838 tons; in materials, calcium metaphosphate 4,231 tons, superphosphate (54%) 618 tons, diammonium phosphate 3,789 tons, and nitrogen solution (30%) 2 tons. Excludes liming materials or the quantities of materials used for the manufacture of the indicated quantities of commercial mixtures. [2] Undetermined quantities may have been used for non-fertilizer purpose. [3] Distributed by manufacturers of fertilizers. [4] Includes all reported quantities of grade. [5] Additional quantities are given free to farmers for which no records are kept. [6] Additional quantities may have been reported by grade under mixtures.

Table 3.—Fertilizers consumed as mixtures and as direct-application materials, year ended June 30, 1959, compared with consumption of previous year, by State and region

State and region	Mixtures			Materials[1]			Grand Total	Comparison with total consumption in year ended June 30, 1958	
	July 1-Dec. 31, 1958	Jan. 1-June 30, 1959	Total	July 1-Dec. 31, 1958	Jan. 1-June 30, 1959	Total		Fertilizer[2]	N, avail. P_2O_5, & K_2O
	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Percent	Percent
Maine	22,415	148,923	171,338	1,724	6,964	8,688	180,026	101	100
New Hampshire	3,342	13,185	16,527	1,438	2,969	4,407	20,934	104	104
Vermont	5,471	32,688	38,159	11,851	5,120	16,971	55,130	96	96
Massachusetts	12,794	58,421	71,215	5,115	13,997	19,112	90,327	104	103
Rhode Island	2,130	12,818	14,948	378	1,454	1,832	16,780	97	97
Connecticut	9,745	51,687	61,432	5,000	12,450	17,450	78,882	103	105
New England	**55,897**	**317,722**	**373,619**	**25,506**	**42,954**	**68,460**	**442,079**	**101**	**101**
New York	117,226	426,000	543,226	25,233	54,765	79,998	623,224	98	100
New Jersey	45,201	184,219	229,420	7,869	18,160	26,029	255,449	118	118
Pennsylvania	165,331	426,656	591,987	21,889	52,167	74,056	666,043	104	105
Delaware	15,947	75,422	91,369	917	3,727	4,644	96,013	116	117
District of Columbia	1,193	2,617	3,810	403	693	1,096	4,906	122	129
Maryland	66,719	223,687	290,406	6,641	15,423	22,064	312,470	112	116
West Virginia	12,684	52,985	65,669	3,206	7,533	10,739	76,408	104	104
Middle Atlantic	**424,301**	**1,391,586**	**1,815,887**	**66,158**	**152,468**	**218,626**	**2,034,513**	**105**	**107**
Virginia	146,408	538,510	684,918	19,180	92,011	111,191	796,109	113	114
North Carolina	187,916	1,185,272	1,373,188	57,418	323,699	381,117	1,754,305	116	117
South Carolina	96,224	543,842	640,066	38,218	216,874	255,092	895,158	122	124
Georgia	253,348	916,156	1,169,504	52,704	255,296	308,000	1,477,504	117	120
Florida	495,505	797,015	1,292,520	64,719	107,469	172,188	1,464,708	100	101
South Atlantic	**1,179,401**	**3,980,795**	**5,160,196**	**232,239**	**995,349**	**1,227,588**	**6,387,784**	**113**	**114**
Ohio	255,850	721,466	977,316	32,885	88,589	121,474	1,098,790	104	107
Indiana	248,307	673,709	922,016	59,397	196,708	256,105	1,178,121	109	112
Illinois	158,147	502,768	660,915	434,458	501,366	935,824	1,596,739	110	119
Michigan	203,140	448,392	651,532	21,329	62,667	83,996	735,528	113	114
Wisconsin	81,714	339,002	420,716	15,385	41,751	57,136	477,852	108	110
East North Central	**947,158**	**2,685,337**	**3,632,495**	**563,454**	**891,081**	**1,454,535**	**5,087,030**	**109**	**113**
Minnesota	84,884	310,365	395,249	43,573	109,695	153,268	548,517	124	123
Iowa	84,237	350,398	434,635	86,776	174,108	260,884	695,519	128	132
Missouri	177,531	353,419	530,950	192,549	209,703	402,252	933,202	123	130
North Dakota	8,407	31,118	39,525	22,144	70,165	92,309	131,834	124	124
South Dakota	1,941	9,328	11,269	5,439	22,005	27,444	38,713	113	110
Nebraska	7,292	39,069	46,361	46,293	212,408	258,701	305,062	131	129
Kansas	56,116	38,503	94,619	97,851	98,187	196,038	290,657	147	144
West North Central	**420,408**	**1,132,200**	**1,552,608**	**494,625**	**896,271**	**1,390,896**	**2,943,504**	**127**	**129**
Kentucky	70,911	414,932	485,843	28,096	82,300	110,396	596,239	112	114
Tennessee	89,528	387,233	476,761	35,747	88,693	124,440	601,201	117	120
Alabama	146,967	655,115	802,082	62,626	214,711	277,337	1,079,419	114	106
Mississippi	23,764	290,154	313,918	135,271	252,129	387,400	701,318	111	113
East South Central	**331,170**	**1,747,434**	**2,078,604**	**261,740**	**637,833**	**899,573**	**2,978,177**	**113**	**113**
Arkansas	21,387	147,167	168,554	42,913	148,116	191,029	359,583	124	126
Louisiana	32,850	127,114	159,964	34,770	96,296	131,066	291,030	105	104
Oklahoma	31,111	40,133	71,244	37,344	25,335	62,679	133,923	125	134
Texas	85,604	205,950	291,554	137,517	236,305	373,822	665,376	100	104
West South Central	**170,952**	**520,364**	**691,316**	**252,544**	**506,052**	**758,596**	**1,449,912**	**108**	**111**
Montana	1,185	1,974	3,159	16,639	21,438	38,077	41,236	108	109
Idaho	2,752	10,822	13,574	37,802	83,476	121,278	134,852	125	123
Wyoming	54	1,424	1,478	3,336	11,117	14,453	15,931	121	118
Colorado	1,836	12,360	14,196	21,904	52,958	74,862	89,058	109	109
New Mexico	752	2,069	2,821	6,485	31,805	38,290	41,111	102	100
Arizona	11,516	17,720	29,236	67,884	98,859	166,743	195,979	95	100
Utah	1,413	5,330	6,743	8,203	22,307	30,510	37,253	93	91
Nevada	515	1,802	2,317	1,109	2,460	3,569	5,886	95	96
Mountain	**20,023**	**53,501**	**73,524**	**163,362**	**324,420**	**487,782**	**561,306**	**105**	**106**
Washington	7,169	39,206	46,375	68,506	128,196	196,702	243,077	98	99
Oregon	6,876	24,220	31,096	44,903	124,330	169,233	200,329	106	107
California	114,928	219,745	334,673	1,046,806	1,207,784	2,254,590	2,589,263	110	111
Pacific	**128,973**	**283,171**	**412,144**	**1,160,215**	**1,460,310**	**2,620,525**	**3,032,669**	**108**	**108**
Total	**3,678,283**	**12,112,110**	**15,790,393**	**3,219,843**	**5,906,738**	**9,126,581**	**24,916,974**	**112**	**114**
Hawaii	25,174	29,323	54,497	41,861	41,771	83,632	138,129	113	114
Puerto Rico	91,223	132,914	224,137	14,960	18,472	33,432	257,569	110	113
United States: 1958-59	**3,794,680**	**12,274,347**	**16,069,027**	**3,276,664**	**5,966,981**	**9,243,645**	**25,312,672**	**112**	**114**
1957-58	**3,420,837**	**10,932,186**	**14,353,023**	**2,994,676**	**5,168,064**	**8,162,740**	**22,515,763**	**100**	**100**
1956-57	**3,704,380**	**10,998,427**	**14,702,807**	**2,875,726**	**5,130,478**	**8,006,204**	**22,709,011**	**101**	**98**

[1] Quantities include the primary nutrient (N, P_2O_5, K_2O) materials and the secondary and trace nutrient materials.

[2] Fertilizers which were guaranteed to contain one or more of the primary nutrients.

Mixtures

In 1958-59 mixtures comprised 63.5 percent of the total tonnage of fertilizers consumed and amounted to 16,069,027 tons—an increase of 1,716,004 tons (12.0 percent) from 14,353,023 tons in the preceding year. This is the first year since 1952-53 that mixtures have shown a tonnage increase and the 1958-59 total establishes a new peak in consumption. There were 1,726 grades reported. In addition over 500 grades, not reported by grade but many of which undoubtedly were duplicated in the above total, were used in California. An unknown number for which the grade was not shown were also reported as miscellaneous tonnage in other States.

Consumption of mixtures was substantially higher in most of the Central and South Atlantic States. Consumption decreased in Arizona, Florida, Hawaii, Montana, New York, Rhode Island, and Vermont. Decreases ranged from 0.3 percent (Florida) to 28.9 percent (Montana), but the total decrease of 24,811 tons in these States represented less than 0.2 percent of the national consumption.

N-P-K mixtures (table 1) represented 90.1 percent of the total tonnage of mixtures, while the other types (N-P, P-K, N-K), accounted for 2.6 percent, 5.5 percent, and 1.8 percent, respectively. The N-P-K type comprised more than 80 percent of the tonnage of mixtures in all regions except the Mountain and Pacific. In these regions, N-P-K mixtures represented 52.1 and 75.1 percent and the N-P type represented 47.8 and 23.7 percent, respectively. Although substantially greater tonnages of mixtures were used, the proportions in which they were consumed in these classes differed little from that in 1957-58.

In the United States, excluding Hawaii and Puerto Rico, 118 grades of mixtures were each used in quantities of 10,000 tons or more. Only 117 of these are listed in table 4 as one grade was marketed by less than three producers. The 118 grades totaled 14,470,486 tons and accounted for 91.64 percent of the quantity of mixtures used. Other grades consumed in amounts of 2,500 to 9,999 tons totaled 113 (592,725 tons, 3.75 percent), whereas those under 2,500 tons totaled 1,380 (350,504 tons, 2.22 percent). The balance (376,678 tons, 2.39 percent) represented mixtures not reported by grades.

Consumption of mixtures in Hawaii and Puerto Rico amounted to 278,634 tons in 161 grades. Many of the grades in Puerto Rico are similar to those used in other areas of the United States but most of those used in Hawaii are designated in fractional numbers.

The 15 grades consumed in largest tonnages in 1958-59 in each of the regions are shown in table 5, together with the quantities for each State in the region. At least 11 of the grades in each area were among the 15 consumed in largest tonnages in the preceding year, but

Table 4.—Principal grades of mixtures consumed in United States, year ended June 30, 1959, compared with consumption of previous year

Grade[1]	Consumption		Proportion of total	
	1958	1959	1958	1959
	Tons	Tons	Percent	Percent
0-9-27	12,853	13,689	0.09	0.09
0-10-20	76,963	90,580	.54	.58
0-10-30	51,339	53,515	.33	.33
0-12-12	11,431	13,640	.08	.09
0-12-36	13,557	13,762	.09	.09
0-14-14	186,776	200,918	1.33	1.27
0-15-30	24,228	30,256	.17	.19
0-15-45	8,914	12,157	.06	.08
0-16-8	9,207	13,073	.06	.08
0-20-10	8,642	10,975	.06	.07
0-20-20	285,711	281,857	2.02	1.79
0-24-24	10,764	15,438	.08	.09
0-25-25	30,247	37,877	.21	.24
0-30-15	10,835	13,510	.08	.09
0-30-30	14,440	13,488	.10	.08
2-12-12	302,441	302,501	2.15	1.92
3-9-6	48,138	37,654	.34	.24
3-9-9	500,107	466,021	3.54	2.95
3-9-12	28,229	49,747	.20	.32
3-9-13	3,570	16,426	.03	.10
3-9-18	63,982	84,886	.45	.54
3-9-27	67,528	61,732	.48	.39
3-11-11	7,804	12,791	.06	.08
3-12-6	89,117	71,452	.63	.45
3-12-12	708,604	626,227	5.03	3.97
3-18-9	29,246	19,550	.20	.12
3-18-18	14,551	18,124	.11	.12
4-6-8	28,720	29,859	.20	.18
4-7-5	114,495	91,709	.81	.59
4-8-4	14,698	12,328	.11	.07
4-8-6	82,839	62,804	.59	.40
4-8-8	137,019	96,380	.97	.61
4-8-10	84,934	83,634	.60	.53
4-8-12	113,281	155,926	.80	.99
4-9-3	49,950	59,968	.36	.38
4-10-6	86,319	120,548	.61	.76
4-10-7	306,541	305,838	2.17	1.94
4-10-10	21,440	22,838	.15	.14
4-11-11	7,531	10,908	.05	.07
4-12-4	41,225	33,262	.29	.21
4-12-8	123,724	112,909	.88	.72
4-12-12	1,021,630	1,240,135	7.24	7.85
4-16-8	26,168	28,554	.19	.18
4-16-16	469,477	448,563	3.32	2.84
5-6-8	12,472	11,048	.09	.07
5-7-5	19,751	16,466	.14	.11
5-10-5	535,745	449,700	3.80	2.85
5-10-10	1,479,466	1,642,700	10.48	10.40
5-10-15	206,112	345,094	1.46	2.18
5-10-30	10,080	15,087	.07	.10
5-12-10	8,196	12,958	.06	.08
5-20-10	85,592	112,603	.60	.72
5-20-20	818,501	983,847	5.81	6.23
6-4-6	17,922	24,202	.12	.15
6-4-8	54,872	64,062	.39	.40
6-6-6	92,844	89,854	.66	.57
6-6-8	37,136	32,792	.26	.21
6-6-12	21,233	30,197	.15	.19
6-6-6	13,443	14,210	.10	.09
6-8-6	115,721	105,287	.82	.67
6-8-8	239,274	252,026	1.69	1.60
6-8-12	14,516	20,870	.11	.13
6-9-12	21,908	11,581	.15	.07
6-10-4	76,780	103,127	.55	.65
6-12-6	35,630	61,793	.25	.40
6-12-12	389,039	482,902	2.76	3.05
6-12-18	9,855	10,955	.07	.07
6-18-6	25,361	37,889	.18	.24
6-24-12	144,589	224,460	1.03	1.42
6-24-24	107,939	172,492	.76	1.10
7-7-7	19,617	17,629	.14	.11
7-28-14	26,933	47,309	.20	.30
8-0-8	12,017	15,459	.08	.10
8-0-24	20,463	25,385	.15	.16
8-4-8	53,300	56,511	.37	.35
8-4-10	6,737	11,001	.04	.07
8-8-8	205,192	217,294	1.46	1.38
8-12-12	68,877	76,165	.48	.48
8-16-16	191,186	200,023	1.36	1.27
8-24-0	21,890	26,665	.15	.17
8-24-8	45,615	56,837	.33	.36
8-24-12	23,877	36,617	.17	.23
8-32-0	52,210	61,897	.37	.39
8-32-16	9,542	19,864	.07	.13
9-6-6	13,892	13,317	.09	.08
9-9-9	33,634	35,875	.24	.23
9-12-12	13,870	17,278	.10	.11
9-36-0	9,526	10,175	.07	.06
10-0-10	17,547	17,714	.12	.12
10-2-10	9,319	13,353	.07	.08
10-5-5	7,615	11,502	.05	.07
10-6-4	78,079	91,320	.56	.58
10-10-5	23,061	22,542	.16	.14
10-10-10	701,970	747,746	4.98	4.74
10-20-0	47,466	47,847	.33	.30
10-20-5	11,912	15,751	.09	.10
10-20-10	165,234	218,214	1.17	1.39
10-20-20	45,248	56,902	.32	.36
12-0-10	16,385	13,505	.11	.09
12-0-12	11,219	15,884	.08	.10
12-6-6	23,024	29,395	.17	.19
12-12-12	690,322	900,038	4.89	5.70
12-24-12	31,862	36,595	.22	.23
13-13-13	47,658	51,419	.34	.32
14-0-14	53,046	66,071	.37	.42
14-14-14	43,390	50,762	.31	.32
15-0-15	11,492	18,622	.08	.12
15-5-5	12,786	13,480	.09	.09
15-10-10	12,089	41,531	.09	.26
15-15-0	20,709	25,339	.14	.16
15-15-15	29,953	36,055	.22	.23
16-8-8	10,983	39,526	.07	.25
16-48-0	19,571	28,824	.14	.18
17-7-0	14,541	12,583	.11	.08
20-0-20	10,275	15,124	.07	.10
24-20-0	8,062	12,237	.06	.08
30-10-0	1,259	10,620	.01	.06
Grades of 10,000 tons or more	12,911,855[2]	14,470,486[8]	91.50	91.64
Grades of 5,000 to 9,999 tons	409,442[4]	350,461[6]	2.90	2.22
Grades of 2,500 to 4,999 tons	215,938[6]	242,264[7]	1.53	1.53
Grades under 2,500 tons	204,304[8]	350,504[9]	1.44	2.22
Not reported by grade	369,801	376,678	2.63	2.39
TOTAL[10]	**14,111,340[11]**	**15,790,393[12]**	**100.00**	**100.00**

[1] Grades consumed in amounts of 10,000 tons or more in year ended June 30, 1959 and their consumption in year ended June 30, 1958. [2] 108 grades. [3] 118 grades. [4] 56 grades. [5] 46 grades. [6] 62 grades. [7] 67 grades. [8] 1,359 grades. [9] 1,380 grades. [10] Does not include the quantity of mixtures consumed in Hawaii or Puerto Rico. [11] 1,585 grades. [12] 1,611 grades.

every year hundreds of multiwall users reduce total packaging costs thru UNION-CAMP'S

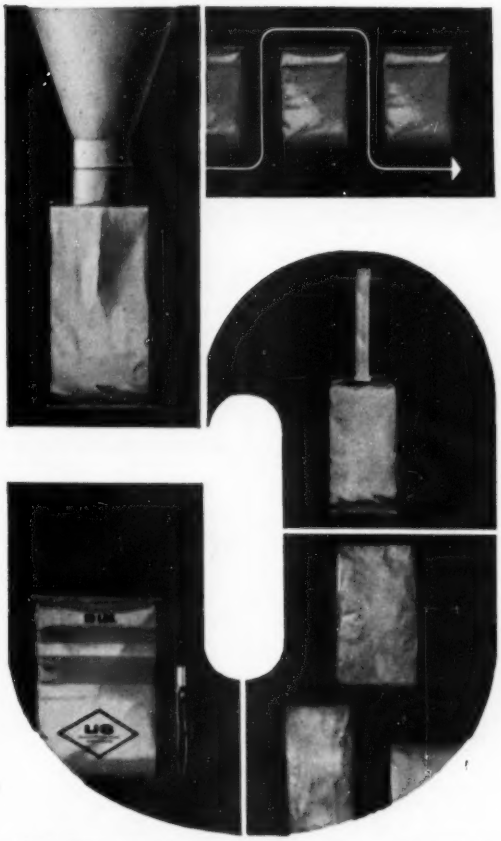

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Table 5—Mixtures consumed in States and regions, by grade, year ended June 30, 1959

State	Consumption of 15 principal grades in indicated region, Tons															Other Grades		Total
																No.[1]	Tons[2]	Tons
New England																		
	8-12-12	10-10-10	5-10-10	8-16-16	0-20-20	6-9-12	0-15-30	8-9-10	15-10-10	5-8-7	6-10-4	11-12-14	6-3-6	12-12-12	8-6-4			
Maine	66,827	27,242	5,687	16,583	1,307	11,581	790	9,495	998	1,624	236	6,974	0	5,889	168	34	15,937	171,338
New Hampshire	862	2,973	2,243	5,283	132	0	1,305	0	955	523	164	0	0	35	230	24	1,822	16,527
Vermont	326	8,568	4,737	7,536	9,785	0	3,460	0	1,981	18	70	0	4	36	60	20	1,578	38,159
Massachusetts	1,143	12,625	15,336	5,733	415	0	1,404	0	1,491	3,376	3,696	0	2,808	133	2,925	29	20,130	71,215
Rhode Island	1,192	1,449	5,273	536	138	0	284	0	193	455	694	0	0	9	1,614	27	3,111	14,948
Connecticut	1,126	11,456	8,456	2,798	716	0	3,567	0	1,891	1,309	2,159	0	3,658	41	1,035	73	23,220	61,432
Total	**71,476**	**64,313**	**41,732**	**38,469**	**12,493**	**11,581**	**10,810**	**9,495**	**7,509**	**7,305**	**7,019**	**6,974**	**6,470**	**6,143**	**6,032**	**97**	**65,798**	**373,619**
Middle Atlantic																		
	5-10-10	10-10-10	5-10-5	8-16-16	0-20-20	3-12-6	6-12-12	10-6-4	4-8-12	3-12-12	10-20-20	12-12-12	2-12-12	5-10-15	4-12-12			
New York	139,959	65,301	109,313	59,579	16,572	1,204	15,668	18,591	1,487	2,417	9,226	18,143	59	9,121	272	88	76,314	543,226
New Jersey	111,100	13,978	24,035	2,187	2,438	651	5,400	7,740	476	1,720	2,131	306	12	1,595	237	78	55,414	229,420
Pennsylvania	274,329	61,491	18,146	38,817	39,936	30,994	10,379	4,586	8,247	9,949	8,529	2,315	4,953	1,674	12,975	152	64,667	591,987
Delaware	41,230	11,763	848	4,267	2,485	232	2,593	224	750	1,611	946	54	3,751	7,083	1,590	67	11,942	91,369
Dist. of Columbia	98	124	1,747	0	1	8	3	822	3	0	0	0	0	0	0	21	1,004	3,810
Maryland	110,131	30,210	26,177	9,344	6,335	16,014	3,293	3,135	17,195	9,961	2,697	415	11,396	1,718	5,114	97	37,271	290,406
West Virginia	33,314	3,986	2,311	304	4,797	5,581	394	422	166	285	594	1,347	2,308	286	100	53	9,474	65,669
Total	**710,161**	**186,853**	**182,577**	**114,498**	**72,564**	**54,684**	**37,730**	**35,520**	**28,324**	**25,943**	**24,123**	**22,580**	**22,479**	**21,477**	**20,288**	**240**	**256,086**	**1,815,887**
South Atlantic																		
	4-12-12	5-10-10	3-9-9	2-12-12	5-10-15	4-8-12	4-10-6	8-8-8	5-10-5	10-10-10	4-8-8	4-7-5	6-6-6	4-8-10	6-8-6			
Virginia	18,250	200,294	52,009	130,008	4,126	0	0	7,010	55,791	49,254	0	0	0	7,890	12,562	23	147,724	684,918
North Carolina	27,721	474,214	312,174	134,966	0	59,280	0	40,157	0	19,900	0	0	0	54,653	39,358	19	210,765	1,373,188
South Carolina	158,858	36,001	48,805	0	1,870	59,007	120,453	7,443	31,625	4,938	0	0	0	0	4,137	28	166,929	640,066
Georgia	697,168	4,465	43,271	8,301	169,704	6,204	75	6,571	3,978	2,117	28,902	2	0	0	20,461	138	178,285	1,169,504
Florida	59,231	4,918	8,349	3,670	3,252	2,568	0	37,691	2,375	17,123	63,021	91,706	89,764	20,852	4,764	964	883,236	1,292,520
Total	**961,228**	**719,892**	**464,608**	**276,945**	**178,952**	**127,059**	**120,528**	**98,872**	**93,769**	**93,332**	**91,923**	**91,708**	**89,764**	**83,395**	**81,282**	**1,006**	**1,586,939**	**5,160,196**
East North Central																		
	5-20-20	12-12-12	3-12-12	4-16-16	10-10-10	6-24-12	5-10-10	0-20-20	6-24-24	3-9-27	0-10-30	7-28-14	5-20-10	10-6-4	8-32-0			
Ohio	119,356	135,113	246,254	53,094	51,930	57,976	100,409	21,878	5,471	822	467	1,734	10,205	13,344	7,825	118	151,438	977,316
Indiana	248,544	167,320	54,938	168,226	34,477	21,764	2,142	31,232	32,808	16,325	9,192	3,706	1,371	2,929	20,888	150	106,154	922,016
Illinois	68,588	76,138	34,920	77,765	81,945	12,432	8,825	22,849	25,900	16,126	3,518	33,367	4,243	3,213	7,179	143	183,907	660,915
Michigan	143,271	120,751	82,312	94,121	18,550	52,721	2,830	9,924	2,911	2,688	2,151	183	23,420	18,268	1,795	96	75,636	651,532
Wisconsin	120,067	9,866	31,015	34,023	35,915	4,431	339	25,293	37,242	17,353	34,155	744	466	753	674	85	68,400	420,716
Total	**699,826**	**509,188**	**449,439**	**427,229**	**222,817**	**149,324**	**114,545**	**111,176**	**104,332**	**53,314**	**49,483**	**39,734**	**39,685**	**38,507**	**38,361**	**270**	**585,535**	**3,632,495**
West North Central																		
	12-12-12	5-20-20	6-24-12	10-10-10	5-20-10	8-24-8	6-24-24	0-20-20	8-24-12	3-12-12	10-20-0	16-48-0	10-20-10	8-32-0	15-15-0			
Minnesota	11,012	99,826	65,618	11,195	6,002	0	16,708	14,678	33,950	293	2,276	865	709	3,358	851	130	127,908	395,249
Iowa	27,320	121,769	5,319	43,294	58,627	457	11,602	12,826	810	5,684	12,208	1,325	4,917	9,860	7,564	224	111,053	434,635
Missouri	246,697	17,885	1,479	11,758	938	31,291	9,944	9,971	0	23,410	0	0	6,511	0	0	32	171,066	530,950
North Dakota	626	326	1,328	46	35	0	128	20	1,427	0	32	3,022	25	193	214	64	32,103	39,525
South Dakota	56	23	277	158	22	0	0	75	97	0	1,400	145	186	1,997	1,301	64	5,532	11,269
Nebraska	1,192	558	49	183	1,342	486	107	449	0	0	4,193	2,418	2,699	5,349	4,448	117	22,888	46,361
Kansas	6,241	388	3	1,754	7	18,480	134	426	0	335	9,043	16,667	8,229	878	7,019	56	25,015	94,619
Total	**293,144**	**240,775**	**74,073**	**68,388**	**66,973**	**50,714**	**38,623**	**38,445**	**36,284**	**29,722**	**29,152**	**24,442**	**23,276**	**21,635**	**21,397**	**331**	**495,565**	**1,552,608**

East South Central

	6-12-12	4-10-7	4-12-12	6-8-8	5-10-15	0-14-14	4-12-8	5-10-5	10-10-10	5-10-10	3-9-6	3-12-12	8-8-8	0-20-20	5-20-20			
Kentucky	41,106	0	1,479	0	108,787	3	93,049	1,953	53,833	15,928	9,094	28,186	284	8,355	26,419	145	97,367	485,843
Tennessee	322,558	473	1,488	1,241	24,981	229	4,684	3,644	6,769	11,723	28,262	3,718	842	7,924	159	115	58,066	476,761
Alabama	499	268,315	251,078	56,967	63	125,570	0	1,091	9,770	294	10	5	23,011	7,855	20	70	57,534	802,082
Mississippi	4,158	5,340	2,851	142,955	0	2,559	8	67,791	7	13,445	0	573	6,826	5,305	3	54	62,097	313,918
Total	**368,321**	**274,128**	**256,896**	**201,163**	**133,831**	**128,361**	**97,741**	**74,479**	**70,379**	**41,390**	**37,366**	**32,482**	**30,963**	**29,439**	**26,601**	**224**	**275,064**	**2,078,604**

West South Central

	10-20-10	5-10-5	12-12-12	8-8-8	6-12-6	12-24-12	6-24-24	6-8-12	13-13-13	3-12-12	10-20-0	5-20-20	0-24-24	6-8-8	0-20-20			
Arkansas	22,477	28,314	16,980	1,635	174	464	3,587	16,561	5,068	1,376	20	1,427	11,592	106	7,231	57	51,542	168,554
Louisiana	5,813	18,494	24,152	30,397	320	1,838	11,819	162	4,828	12,412	1	9,517	0	11,041	3,561	58	25,609	159,964
Oklahoma	31,933	2,809	631	219	7,970	2,448	788	3	418	845	7,470	697	0	0	181	49	14,832	71,244
Texas	117,847	24,419	5,334	11,891	29,848	19,995	1,602	4	6,115	621	7,360	2,684	3	87	170	122	63,574	291,554
Total	**178,070**	**74,036**	**47,097**	**44,142**	**38,312**	**24,745**	**17,796**	**16,730**	**16,429**	**15,254**	**14,851**	**14,325**	**11,595**	**11,234**	**11,143**	**178**	**155,557**	**691,316**

Mountain

	24-20-0	10-20-5	20-20-0	6-10-4	21-20-0	20-10-0	8-24-0	10-20-0	10-10-10	16-16-8	8-25-0	10-20-10	13-11-0	10-10-5	10-18-5			
Montana	265	0	747	175	0	418	210	255	0	199	0	0	0	0	48	19	842	3,159
Idaho	5,106	0	3,114	260	0	573	1,653	138	7	424	0	0	233	0	73	38	1,993	13,574
Wyoming	13	0	161	30	0	58	11	220	0	63	0	27	0	0	31	26	864	1,478
Colorado	0	4	460	965	106	249	0	153	949	623	0	204	0	121	820	83	9,542	14,196
New Mexico	0	327	421	106	0	115	378	26	28	0	0	179	0	31	0	28	1,210	2,821
Arizona	0	6,107	0	398	3,818	2,362	579	1,614	1,295	444	1,447	1,097	0	893	0	51	9,182	29,236
Utah	1,185	0	222	2,802	0	64	0	65	0	317	0	4	1,230	0	99	22	755	6,743
Nevada	0	0	161	496	0	23	0	147	121	60	198	0	0	111	0	18	1,000	2,317
Total	**6,569**	**6,438**	**5,286**	**5,232**	**3,924**	**3,862**	**2,831**	**2,618**	**2,400**	**2,130**	**1,645**	**1,511**	**1,463**	**1,156**	**1,071**	**176**	**25,388**	**73,524**

Pacific

	10-10-10	10-10-5	6-10-4	17-7-0	15-8-4	8-8-4	10-20-20	8-24-0	11-8-4	6-20-20	10-16-8	5-3-2	12-8-4	4-10-10	5-10-10			
Washington	481	481	2,475	0	0	4	5,087	5,246	0	1,897	403	1,682	3,749	0	2,543	109	22,327	46,375
Oregon	738	62	3,446	0	0	0	2,405	1,840	0	2,897	3,909	2,424	0	0	653	75	12,722	31,096
California	32,632	16,961	10,224	12,577	8,026	7,548	0	0	6,173	0	0	0	0	3,535	0	6[2]	236,997	334,673
Total	**33,851**	**17,504**	**16,145**	**12,577**	**8,026**	**7,552**	**7,492**	**7,086**	**6,173**	**4,794**	**4,312**	**4,106**	**3,749**	**3,535**	**3,196**	**148**	**272,046**	**412,144**

Other[4]

	14-4-10	15-4-7	14-2-8	10-10-8	12-6-10	10-6-20	8-6-10	12-6-8	6-8-10	12-4-10	13-3-12	12-3-16	9-10-5	12-2-10	12-10-5			
Puerto Rico	72,693	21,345	18,832	13,438	10,197	9,972	9,925	8,349	7,047	6,569	6,128	5,596	4,915	4,113	4,105	22	20,913	224,137

United States[5]

	5-10-10	4-12-12	5-20-20	12-12-12	10-10-10	3-12-12	6-12-12	3-9-9	5-10-5	4-16-16	5-10-15	4-10-7	2-12-12	0-20-20	6-8-8			
New England	41,732	0	0	6,143	64,313	5	2,120	0	5,821	0	4	0	0	12,493	3,478	103	237,510	373,619
Mid. Atlantic	710,161	20,288	2,124	22,580	186,853	25,943	37,730	664	182,577	645	21,477	0	22,479	72,564	87	241	509,715	1,815,887
So. Atlantic	719,892	961,228	0	3,261	93,332	73,382	23,052	464,608	93,769	1,062	178,952	31,710	276,945	5,595	36,064	1,007	2,197,344	5,160,196
E. No. Central	114,545	1,545	699,826	509,188	222,817	449,439	33,230	218	11,992	427,229	10,408	0	3	111,176	0	273	1,040,879	3,632,495
W. No. Central	1,911	44	240,775	293,144	68,388	29,722	12,641	0	6,373	15,457	2	0	0	38,445	0	335	845,706	1,552,608
E. So. Central	41,390	256,896	26,601	17,673	70,379	32,482	368,321	531	74,479	4,170	133,831	274,128	3,074	29,439	201,163	224	544,047	2,078,604
W. So. Central	9,871	134	14,325	47,097	5,413	15,254	5,770	0	74,036	0	420	0	0	11,143	11,234	182	496,619	691,316
Mountain	2	0	0	379	2,400	0	21	0	418	0	0	0	0	34	0	185	70,270	73,524
Pacific	3,196	0	196	573	33,851	0	17	0	235	0	0	0	0	968	0	156	373,108	412,144
Total	**1,642,700**	**1,240,135**	**983,847**	**900,038**	**747,746**	**626,227**	**482,902**	**466,021**	**449,700**	**448,563**	**345,094**	**305,838**	**302,501**	**281,857**	**252,026**	**1,596**	**6,315,198**	**15,790,393**

[1] Excludes mixtures not reported by grade. [2] Includes the tonnage of mixtures not reported by grade. [3] Total number of mixtures exceeds 500 of which only 14 were reported by grade. [4] Total consumption in Hawaii was 54,497 tons of mixtures, comprising 128 grades, most of which were manufactured to consumers' specification. [5] Excludes Hawaii and Puerto Rico.

not always in the same order of tonnage. In most cases, shifts in the order of grades resulted from increased use of grades of higher nitrogen content. Except in the Mountain region, the first four grades used in largest tonnage in 1957-58 also were the first four in 1958-59. The listed grades in 1958-59 accounted for 50 percent or more of the total quantity of mixtures consumed in each of the States except California,, Colorado, Florida, North Dakota, and Wyoming. In these States, they represented 19 to 33 percent of the total. In California and Florida over 500 and 1,000 grades, respectively, are used annually whereas in Colorado, North Dakota, and Wyoming direct-application materials dominate the tonnage of fertilizer consumed.

The total tonnage of the 15 grades shown for the United States, excluding Hawaii and Puerto Rico, represented 60.0 percent of the tonnage of all mixtures. Nearly two-thirds of the tonnage was supplied by approximately one percent of the number of reported grades. As in the preceding year, the 5-10-10, 4-12-12, and 5-20-20 grades were consumed in largest tonnage, in descending order, respectively. The other 12 grades were the same as in 1957-58 but in general their relative tonnages differed appreciably.

The 5-10-10 grade and the 1:2:2 plant-nutrient ratio were consumed in larger tonnage than any other grade and ratio, respectively, both in 1957-58 and in 1958-59. The total tonnage of all grades of mixtures reported in the 10 nutrient ratios listed in table 6 accounted for 75.2 percent of the total use of mixtures reported by grade in the United States (excluding Hawaii and Puerto Rico) in 1958-59. These 10 ratios are in the same relative order as in 1957-58, except that the 1:2:3 ratio precedes the 1:4:2 in 1958-59.

The weighted average primary plant nutrient content of mixtures is shown for each State and region in table 7. The national average in 1958-59 was 6.22 percent of N, 12.54 percent of available P_2O_5, and 11.91 percent of K_2O, a total of 30.67 percent. Compared with the corresponding averages in 1957-58, the increase was highest for N (4.36 percent), while that for available P_2O_5 was only 0.08 percent, and for K_2O 1.53 percent. These percentages reflect the trend toward increased concentration of primary nutrients in mixtures used throughout the United States. The high rate for nitrogen resulted from substantial increases in average nitrogen contents in 45 areas and decreases in only 5. The low rate for available P_2O_5 was the result of decreases in 27 areas offsetting increases in 22. The rate for K_2O increased in 29 areas and decreased in 22.

Materials

In 1958-59, the total consumption of materials for direct application, including secondary and trace nutrient materials, amounted to 9,243,645 tons or 36.5 percent of all fertilizers used (table 3). The quantity of these materials was 1,080,905 tons (13.2 percent) more than the 8,162,740 tons used in 1957-58. In most States, changes in consumption of direct-application materials closely corresponded to changes in the consumption of mixtures. The tonnages of the principal materials consumed in 1958-59 are shown in tables 1 and 8, and changes in consumption from the preceding year are summarized, by classes, in table 9.

Although the total tonnage of all classes increased compared with 1957-58, the change was largest in chemical nitrogen materials and in secondary and trace nutrient materials, followed by phosphates, potash, and natural organics, in the order named. More than one-half of the increase in consumption of materials was in chemical nitrogen materials. Consumption of this class was 616,427 tons (15.9 percent) more than in 1957-58. Increases in the other classes of materials were 283,476 tons (30.2 percent) for the secondary and trace nutrients, 109,912 tons (4.6 percent) for phosphates, 46,394 tons (10.3 percent) for potash, and 24,696 tons (5.0 percent) for the natural organics.

Consumption of nearly all chemical nitrogen materials for direct application substantially increased in 1958-59. However, less ammonium sulfate and calcium cyanamide were used than in 1957-58. The decrease for ammonium sulfate may have been due to supply and distribution problems inasmuch as consumption for direct application increased in most producing areas. However, the much larger tonnage of mixtures consumed (in the formulation of which ammonium sulfate finds principal use) may have resulted in shortages for direct application in areas distant from production centers. The use of calcium cyanamide decreased in many areas.

Consumption of the natural organic products increased about five percent from the preceding year. Dried manures accounted for most of the increase in this class.

Among the phosphate products, the principal changes involved increased use of ammoniated phosphates and superphosphates, and decreased use of phosphate rock. The principal changes occurred in States in which these products were used in largest quantity. The increase in the tonnage of the ammoniated phosphate grades (11-48, 13-39, 16-20, 27-14) accounted for more than one-half of the increase in the phosphate class. The 21-53 grade, however, was not used for direct application to as great an extent as in 1957-58. The separate tonnages of these ammoniated phosphate grades are listed, by States, in table 10. All other N-P grades such as: 8-24-0, 16-48-0, and 24-20-0, are included as mixtures in tables 1, 4, and 5. In addition to the seven N-P grades listed in table 10, there were reported 161 N-P grades consumed

Table 6.—Ratios of primary nutrients in mixtures consumed in United States, years ended June 30, 1958 and 1959[1]

Nutrient ratio[2]	Mixtures consumed: Quantity		Mixtures consumed: Percent of total	
	1958	1959	1958	1959
	Tons	Tons	Percent	Percent
1:2:2	2,245,038	2,481,685	16.3	16.1
1:4:4	2,104,639	2,231,166	15.3	14.5
1:1:1	1,868,314	2,151,158	13.6	14.0
1:3:3	1,535,657	1,718,637	11.2	11.1
1:2:1	800,611	797,524	5.8	5.2
0:1:1	546,498	569,675	4.0	3.7
1:2:3	331,163	513,243	2.4	3.3
1:4:2	381,942	504,242	2.8	3.2
1:6:6	316,992	320,625	2.3	2.1
4:10:7	306,711	306,146	2.2	2.0
Sub-total	10,437,565	11,594,101	75.9	75.2
Other[3]	3,303,974	3,819,614	24.1	24.8
Total[4]	**13,741,539**	**15,413,715**	**100.0**	**100.0**

[1] Excludes Hawaii and Puerto Rico.
[2] N:available P_2O_5:K_2O.
[3] All other ratios of mixtures reported by grade.
[4] Excludes mixtures not reported by grade.

Table 7.—Primary plant nutrient content of mixtures and of materials, as a weighted average, by States and regions, year ended June 30, 1959[1]

Percent

State and region	Mixtures[2]				Materials					
					Single nutrient[3]			Multiple nutrient [3]	Total nutrients	Total in mixtures and materials
	N	Available P_2O_5	K_2O	Total	N	Available P_2O_5 [4]	K_2O			
Maine	8.37	12.02	12.48	32.87	31.00	20.21	60.99	9.84	18.19	32.16
New Hampshire	7.49	12.53	13.33	33.35	31.47	20.17	59.85	10.64	22.78	31.13
Vermont	5.64	14.71	16.14	36.49	34.41	19.94	61.58	9.63	22.04	32.04
Massachusetts	7.30	10.09	9.72	27.11	19.35	20.16	59.77	11.52	16.93	24.96
Rhode Island	6.60	10.12	10.24	26.96	21.06	19.00	57.74	9.86	15.55	25.72
Connecticut	7.32	9.89	10.43	27.64	28.09	21.63	54.65	14.90	21.36	26.25
New England	**7.61**	**11.52**	**11.95**	**31.08**	**25.76**	**20.32**	**58.28**	**12.20**	**19.83**	**29.33**
New York	6.70	12.04	10.41	29.15	28.59	21.71	50.53	10.46	23.86	28.48
New Jersey	5.90	10.73	10.37	27.00	27.31	19.63	53.72	11.38	22.81	26.58
Pennsylvania	5.59	12.51	11.91	30.01	29.39	19.17	56.21	14.99	23.49	29.32
Delaware	5.56	11.18	12.59	29.33	31.20	20.66	56.42	12.12	29.63	29.34
District of Columbia	7.67	9.47	6.02	23.16	15.99	20.47	60.73	10.38	11.12	20.50
Maryland	5.39	11.30	10.86	27.55	31.13	17.59	55.59	15.18	26.65	27.49
West Virginia	4.64	12.20	10.76	27.60	22.70	23.08	60.75	14.07	23.45	27.09
Middle Atlantic	**5.90**	**11.87**	**11.08**	**28.85**	**28.91**	**20.45**	**53.90**	**12.55**	**23.92**	**28.33**
Virginia	4.33	11.07	11.77	27.17	23.92	27.88	20.43	25.76	23.86	26.77
North Carolina	4.62	9.42	10.67	24.71	25.07	16.80	38.20	11.25	25.15	24.80
South Carolina	4.26	10.20	10.48	24.94	20.84	15.35	58.94	26.93	23.22	24.46
Georgia	4.51	10.76	12.02	27.29	28.29	15.75	57.37	17.49	28.26	27.46
Florida	6.09	6.62	9.19	21.90	24.72	13.65	41.35	17.77	21.79	21.89
South Atlantic	**4.88**	**9.34**	**10.73**	**24.95**	**24.81**	**16.81**	**41.17**	**18.58**	**24.83**	**24.93**
Ohio	6.14	14.73	13.16	34.03	33.04	23.80	57.62	28.75	32.44	33.86
Indiana	6.46	16.77	16.09	39.32	42.59	29.37	60.59	41.40	45.64	40.69
Illinois	7.37	16.20	13.65	37.22	37.52	8.53	61.89	25.84	21.54	28.03
Michigan	6.42	15.92	14.84	37.18	41.23	18.86	55.96	16.22	32.77	36.68
Wisconsin	4.54	16.23	20.78	41.55	45.19	23.37	59.36	12.69	40.39	41.41
East North Central	**6.31**	**15.90**	**15.18**	**37.39**	**39.02**	**10.55**	**60.83**	**24.12**	**28.08**	**34.73**
Minnesota	6.17	21.44	15.76	43.37	48.28	43.16	60.34	41.28	46.78	44.33
Iowa	7.11	18.73	12.94	38.78	44.83	34.87	60.80	37.71	41.90	39.95
Missouri	10.07	13.98	12.73	36.78	44.19	6.20	60.97	26.54	21.19	30.06
North Dakota	15.63	27.85	3.82	47.30	43.13	45.55	34.81	49.36	48.26	47.98
South Dakota	13.92	22.01	1.69	37.62	39.50	44.24	63.92	40.33	40.94	39.98
Nebraska	10.52	23.76	3.60	37.88	51.55	42.80	32.53	50.86	50.68	48.73
Kansas	11.93	24.39	5.87	42.19	37.61	43.60	61.11	39.70	39.30	40.24
West North Central	**8.54**	**18.55**	**12.56**	**39.65**	**45.95**	**21.16**	**60.00**	**43.34**	**38.12**	**38.39**
Kentucky	5.42	11.80	12.36	29.58	36.48	25.86	54.78	38.05	35.10	30.60
Tennessee	5.93	12.13	11.91	29.97	33.40	24.62	39.98	36.05	32.95	30.58
Alabama	3.68	8.61	10.43	22.72	25.82	14.46	59.74	34.28	24.84	23.26
Mississippi	6.41	10.26	9.42	26.09	38.31	12.74	59.13	46.52	30.94	28.77
East South Central	**5.01**	**10.41**	**11.07**	**26.49**	**32.98**	**16.55**	**51.54**	**38.22**	**29.87**	**27.51**
Arkansas	6.79	15.09	14.83	36.71	38.07	37.26	59.53	37.68	41.58	39.30
Louisiana	7.12	13.66	11.38	32.16	39.70	17.06	56.28	33.58	37.58	34.59
Oklahoma	9.19	19.70	7.86	36.75	38.09	26.62	58.03	41.23	32.98	34.99
Texas	9.27	17.21	8.56	35.04	51.14	26.17	43.84	37.86	43.44	39.74
West South Central	**8.16**	**16.13**	**10.67**	**34.96**	**44.29**	**26.69**	**58.01**	**38.24**	**41.09**	**38.16**
Montana	14.70	20.68	4.55	39.93	41.03	45.71	61.20	44.64	44.48	44.13
Idaho	18.66	20.13	1.23	40.02	29.91	45.70	62.20	39.80	35.31	35.82
Wyoming	14.47	19.46	2.68	36.61	40.36	44.94	56.80	61.35	45.48	44.64
Colorado	13.30	20.07	7.62	40.99	39.71	46.65	52.41	54.17	43.64	43.20
New Mexico	11.50	14.68	3.64	29.82	49.05	34.51	58.68	40.04	40.70	39.95
Arizona	13.15	17.17	4.12	34.44	40.90	34.10	54.07	40.30	40.28	39.33
Utah	12.37	14.56	3.00	29.93	33.40	40.54	62.24	40.42	36.58	35.36
Nevada	11.94	12.69	2.86	27.49	35.55	47.99	55.04	35.61	37.81	33.47
Mountain	**14.12**	**18.00**	**4.09**	**36.21**	**37.60**	**42.35**	**56.10**	**42.61**	**39.86**	**39.06**
Washington	10.18	14.90	8.54	33.62	39.15	35.79	50.20	37.86	39.08	38.00
Oregon	9.62	15.76	8.64	34.02	29.64	23.56	55.12	36.93	30.81	31.33
California	11.13	11.64	6.36	29.13	30.20	26.52	54.95	13.15	24.19	25.25
Pacific	**10.91**	**12.32**	**6.78**	**30.01**	**31.46**	**27.21**	**53.06**	**15.97**	**26.65**	**27.34**
Average for 48 States & D. C.	**6.11**	**12.65**	**11.91**	**30.67**	**35.08**	**18.59**	**55.79**	**26.41**	**31.05**	**30.79**
Hawaii	12.79	8.30	20.18	41.27	23.25	22.06	59.44	64.53	30.34	34.75
Puerto Rico	12.37	5.26	10.16	27.79	23.16	36.50	48.62	30.61	23.47	27.23
United States: 1958-59	**6.22**	**12.54**	**11.91**	**30.67**	**34.86**	**18.61**	**55.89**	**26.52**	**31.01**	**30.78**
1957-58	**5.96**	**12.53**	**11.73**	**30.22**	**34.43**	**17.95**	**55.67**	**25.48**	**30.11**	**30.18**
1956-57	**5.74**	**12.36**	**11.43**	**29.53**	**32.62**	**17.92**	**55.20**	**24.14**	**28.81**	**29.30**

[1] Excludes fertilizers not guaranteed to contain one or more of the primary nutrients, N, P_2O_5, or K_2O. [2] Guaranteed to contain two or more of the primary nutrients. [3] Guaranteed to contain one of the primary nutrients. [4] Includes a weighted average of 2 percent for the colloidal phosphate and 3 percent for the phosphate rock marketed for direct application.

Table 8.—Materials for direct application consumed in States and regions, by class and by product, year ended June 30, 1959[1]

Tons

State and region	Chemical nitrogen materials									Natural organics[2]	Phosphate materials[3]			Potash materials[3]			Total	
	Ammonia (anhydrous)	Ammonium nitrate	Ammonium nitrate-limestone mixtures	Ammonium sulfate	Calcium cyanamide	Nitrogen solutions and aqua ammonia[4]	Sodium nitrate	Urea	Other[5]		Phosphate rock[3]	Superphosphates: Grades 22 percent and under	Superphosphates: Grades over 22 percent	Other	Chlorides 50-62 percent grades	Other	Primary nutrient materials	Secondary and trace nutrient materials[6]
Maine	0	1,106	5	97	93	239	113	147	96	4,252	2	2,198	10	127	164	2	8,651	37
New Hampshire	0	834	3	2	57	73	59	165	25	875	51	2,081	2	55	112	5	4,399	8
Vermont	0	1,013	16	0	0	159	33	313	11	358	152	14,463	0	48	390	1	16,957	14
Massachusetts	0	1,337	32	248	261	205	796	282	252	10,989	65	3,301	0	720	596	22	19,106	6
Rhode Island	0	92	0	5	70	0	42	67	66	1,158	20	216	0	50	32	2	1,820	12
Connecticut	0	785	2	88	170	807	674	606	192	7,385	72	4,381	357	566	577	768	17,430	20
New England	**0**	**5,167**	**58**	**440**	**651**	**1,483**	**1,717**	**1,580**	**642**	**25,017**	**362**	**26,640**	**369**	**1,566**	**1,871**	**800**	**68,363**	**97**
New York	650	15,741	285	213	2,278	2,156	4,041	1,996	1,007	16,324	536	29,251	815	849	1,556	1,495	79,193	805
New Jersey	582	3,198	194	435	1,704	366	1,859	882	520	8,871	199	3,827	17	1,360	1,319	462	25,795	234
Pennsylvania	777	10,183	105	6,107	878	883	1,619	1,393	642	11,889	4,230	26,110	119	2,364	2,311	807	70,417	3,639
Delaware	43	1,015	41	12	760	933	143	242	31	434	40	286	33	104	197	30	4,344	300
District of Columbia	0	16	0	2	0	0	16	2	15	950	0	13	0	73	1	0	1,088	8
Maryland	971	3,818	719	41	1,324	1,670	2,669	372	178	2,155	1,681	3,472	62	1,092	683	170	21,077	987
West Virginia	0	751	41	283	13	0	1,301	79	29	315	135	6,656	812	98	208	1	10,722	17
Middle Atlantic	**3,023**	**34,722**	**1,385**	**7,093**	**6,957**	**6,008**	**11,648**	**4,966**	**2,422**	**40,938**	**6,821**	**69,615**	**1,858**	**5,940**	**6,275**	**2,965**	**212,636**	**5,990**
Virginia	637	5,928	24,795	1,120	1,021	14,270	14,462	176	10	1,072	1,073	8,520	1,365	3,015	4,324	13,023	94,811	16,380
North Carolina	9,598	18,176	122,007	1,085	5,075	50,360	73,872	166	0	4,813	1,957	17,317	0	5,642	10,755	10,935	331,758	49,359
South Carolina	1,927	21,701	72,125	215	560	34,931	78,438	52	0	1,498	204	10,749	172	5,832	15,923	5,686	250,013	5,079
Georgia	13,059	85,807	39,397	3,045	813	31,481	61,760	289	1,405	2,056	1,197	9,152	19	5,407	6,522	752	262,161	45,839
Florida	3,251	24,413	4,811	2,957	1,904	7,043	31,906	2,185	11,930	21,644	14,604	7,805	3,904	6,431	3,105	19,192	167,085	5,103
South Atlantic	**28,472**	**156,025**	**263,135**	**8,422**	**9,373**	**138,085**	**260,438**	**2,868**	**13,345**	**31,083**	**19,035**	**53,543**	**5,460**	**26,327**	**40,629**	**49,588**	**1,105,828**	**121,760**
Ohio	5,496	25,219	271	23,776	313	8,497	620	4,451	901	7,592	5,927	15,793	7,159	4,979	9,281	901	121,176	298
Indiana	27,962	49,172	20	11,526	270	49,351	148	8,279	213	4,040	10,358	3,717	16,873	7,044	66,422	599	255,994	111
Illinois	41,626	67,664	134	72,868	171	30,439	68	1,753	788	13,392	506,250	22,392	63,895	9,164	102,820	1,657	935,081	743
Michigan	8,124	11,066	30	4,006	58	12,650	361	3,180	1,341	16,563	3,586	9,680	1,317	2,757	6,006	1,436	82,161	1,835
Wisconsin	4,675	8,714	0	1,341	0	4,903	0	335	627	10,141	2,685	2,912	1,705	1,215	16,785	753	56,791	345
East North Central	**87,883**	**161,835**	**455**	**113,517**	**812**	**105,840**	**1,197**	**17,998**	**3,870**	**51,728**	**528,806**	**54,494**	**90,949**	**25,159**	**201,314**	**5,346**	**1,451,203**	**3,332**
Minnesota	18,761	24,182	30	783	0	29,649	0	227	207	8,713	1,091	5,453	20,583	29,601	13,682	208	153,170	98
Iowa	30,090	68,131	0	5,421	0	28,806	0	1,118	144	4,347	6,028	36,056	32,799	30,897	16,965	48	260,850	34
Missouri	28,871	79,604	0	1,034	0	18,030	394	481	200	4,300	229,661	1,858	13,307	6,188	17,830	219	401,977	275
North Dakota	1,026	3,464	0	130	0	268	0	30	12	65	0	70	18,268	68,954	7	15	92,309	0
South Dakota	1,387	8,613	0	43	0	1,727	0	359	95	610	40	239	6,222	8,050	57	0	27,442	2
Nebraska	80,914	66,727	0	1,686	0	69,427	0	2,294	75	358	912	1,285	19,119	14,392	386	965	258,540	161
Kansas	7,500	81,159	0	501	0	23,050	0	458	47	893	562	714	30,008	49,453	1,577	0	195,922	116
West North Central	**168,549**	**331,880**	**30**	**9,598**	**0**	**170,957**	**394**	**4,967**	**780**	**19,286**	**238,294**	**45,675**	**140,306**	**207,535**	**50,304**	**1,455**	**1,390,210**	**686**
Kentucky	4,169	37,429	85	897	1,534	3,679	1,871	340	13	664	9,519	21,744	2,488	9,488	10,372	5,945	110,237	159
Tennessee	9,047	39,514	131	207	2,192	165	24,666	34	27	1,375	3,650	10,060	1,806	9,185	12,594	9,304	123,957	483
Alabama	5,803	81,058	32,217	12,164	279	2,722	75,337	10	1,182	664	1,058	22,967	83	28,350	9,065	154	273,113	4,224
Mississippi	41,512	132,661	5,783	643	3,125	13,112	44,269	3,159	69	125	4,049	32,682	1,563	87,892	16,006	579	387,229	171
East South Central	**60,531**	**290,662**	**38,216**	**13,911**	**7,130**	**19,678**	**146,143**	**3,543**	**1,291**	**2,828**	**18,276**	**87,453**	**5,940**	**134,915**	**48,037**	**15,982**	**894,536**	**5,037**
Arkansas	24,104	50,701	17	3,563	5,546	12,437	32,033	13,003	381	39	291	4,933	10,564	1,498	31,636	280	191,026	3
Louisiana	25,710	35,708	954	10,583	1,136	9,175	23,163	1,822	538	469	2,730	7,316	1,386	5,692	3,283	357	130,022	1,044
Oklahoma	1,567	6,688	0	1,259	30	694	524	235	22	1,406	3,943	19,438	10,267	16,026	526	29	62,654	25
Texas	94,473	28,806	1,572	66,749	1,280	9,267	1,481	8,120	85	4,941	12,829	29,890	20,190	88,337	1,742	1,228	370,990	2,832
West South Central	**145,854**	**121,903**	**2,543**	**82,154**	**7,992**	**31,573**	**57,201**	**23,183**	**1,026**	**6,855**	**19,793**	**61,577**	**42,407**	**111,533**	**37,187**	**1,894**	**754,692**	**3,904**
Montana	1,406	5,303	1	701	0	239	0	11	29	172	0	0	18,252	11,463	31	0	37,608	469
Idaho	5,120	21,153	3	21,498	0	20,080	0	428	402	273	50	83	24,842	18,147	726	0	112,805	8,473
Wyoming	1,013	3,385	0	629	0	964	0	530	22	61	0	0	4,814	2,599	29	5	14,051	402
Colorado	6,338	24,374	2	5,410	7	3,888	0	2,132	153	2,378	40	95	16,221	9,769	434	331	71,572	3,290
New Mexico	4,825	2,062	59	3,395	0	1,462	8	1,309	68	790	0	7,628	9,482	6,893	49	8	38,038	252
Arizona	25,014	10,589	141	22,149	599	16,025	294	12,907	8,397	1,703	125	5,852	3,144	42,020	202	939	150,100	16,643
Utah	1,484	9,493	7	4,810	0	143	0	277	584	454	0	2,151	7,317	3,327	62	0	30,109	401
Nevada	315	101	1	461	0	586	0	32	20	84	0	1	479	1,094	3	7	3,184	385
Mountain	**45,515**	**76,660**	**214**	**59,053**	**606**	**43,387**	**302**	**17,626**	**9,675**	**5,915**	**215**	**15,810**	**84,551**	**95,312**	**1,536**	**1,290**	**457,467**	**30,315**
Washington	37,025	23,392	301	14,974	126	63,628	110	1,949	653	3,733	492	4,417	7,720	24,286	4,062	2,076	188,944	7,758
Oregon	9,954	28,475	14	39,388	806	32,172	0	3,489	2,244	1,814	388	9,270	2,117	26,340	1,570	494	158,535	10,698
California	93,483	42,276	0	173,401	6,385	325,335	103	22,310	29,935	328,598[7]	1,039	75,350	17,933	100,764	1,398	5,635	1,223,945	1,030,645
Pacific	**140,462**	**94,143**	**315**	**227,763**	**7,317**	**421,135**	**231**	**27,748**	**32,832**	**334,145**	**1,919**	**89,037**	**27,770**	**151,390**	**7,030**	**8,205**	**1,571,424**	**1,049,101**
Total	**680,289**	**1,272,797**	**306,351**	**521,951**	**40,838**	**938,146**	**479,253**	**104,476**	**65,883**	**517,795**	**833,521**	**503,844**	**399,610**	**759,697**	**394,383**	**87,525**	**7,906,359**	**1,220,222**
Hawaii	0	0	0	3,818	0	41,511	115	5,556	103	60	4,147	5,373	3,866	3,302	11,176	1,623	80,650	2,982
Puerto Rico	784	0	0	24,176	0	7,601	8	144	6	93	0	55	90	252	22	203	33,432	0
United States: 1958-59	**681,073**	**1,272,797**	**306,351**	**549,945**	**40,838**	**987,258**	**479,374**	**110,176**	**65,992**	**517,948**	**837,668**	**509,272**	**403,566**	**763,251**	**405,581**	**89,351**	**8,020,441**	**1,223,204**
1957-58	**583,434**	**1,116,908**	**263,512**	**577,111**	**46,348**	**689,608**	**435,509**	**98,383**	**66,564**	**493,252**	**851,545**	**477,890**	**374,363**	**700,047**	**364,790**	**83,748**	**7,223,012**	**939,728**
1956-57	**452,702**	**1,105,196**	**300,586**	**516,183**	**46,978**	**627,310**	**493,159**	**108,916**	**55,398**	**479,671**	**836,183**	**559,998**	**373,969**	**645,813**	**376,169**	**84,730**	**7,062,961**	**943,243**

[1] Does not include liming materials or the quantities of materials used for manufacture of commercial mixtures. [2] The principal kinds are shown separately, by regions, in table 1. [3] Includes colloidal phosphate, the quantity of which is shown separately, by regions, in table 1. [4] Includes an estimate of 270,000 tons of dried manures.

Table 9.—Classes of direct-application materials consumed in United States, years ended June 30, 1958 and 1959[1]

Class	Consumption			
	1958	1959	Change from 1958	
	Tons	Tons	Tons	Percent
Chemical nitrogen materials	3,877,377	4,493,804	616,427	15.9
Natural organic materials	493,252	517,948	24,696	5.0
Phosphate materials	2,403,845	2,513,757	109,912	4.6
Potash materials	448,538	494,932	46,394	10.3
Secondary and trace nutrient materials	939,728	1,223,204	283,476	30.2
Total	**8,162,740**	**9,243,645**	**1,080,905**	**13.2**

[1] Includes Hawaii and Puerto Rico.

in the United States (exclusive of Hawaii and Puerto Rico).

Except for potassium sulfate and a few of the miscellaneous potash products for which decreases were negligible, consumption of potash products increased in 1958-59.

The quantities of the secondary and trace nutrient materials, particularly those containing calcium and sulfur, were substantially higher in 1958-59 than in 1957-58. The use of gypsum (1,160,667 tons) comprising nearly 95 percent of the total tonnage of this class of products increased 271,965 tons (30.6 percent).

The weighted average primary-nutrient contents of the direct-application materials used in each of the areas are shown in table 7. These averages were computed from the actual analysis and reported tonnages of the individual materials comprising the respective classes. In 1958-59, single-nutrient nitrogen materials averaged 34.86 percent N, phosphate materials 18.61 percent available P_2O_5, and potash materials 55.89 percent K_2O. Multiple-nutrient materials averaged 26.52 and all materials 31.01 percent total plant nutrients. The corresponding averages in 1957-58 were 34.43, 17.95, 55.67, 25.48, and 30.11 percent. The higher averages for 1958-59 reflect increased use of higher analysis products.

The averages for materials containing only N ranged from 15.99 percent (District of Columbia) to 51.55 percent (Nebraska). Processed tankage in the District of Columbia and anhydrous ammonia in Nebraska represented the principal products consumed in this class in these areas.

The single-nutrient P_2O_5 materials ranged from 6.20 percent (Missouri) to 47.99 percent (Nevada). The low average for Missouri resulted from the use of a large tonnage of phosphate rock with an estimated available P_2O_5 content of three percent. The high average for Nevada resulted from use of calcium metaphosphate and superphosphates containing over 22 percent available P_2O_5 as the principal phosphorus sources.

The range for the K_2O class was 20.43 percent in Virginia resulting from use of a large tonnage of lime-potash mixtures (6 percent K_2O content) to 63.92 percent in South Dakota where a high-grade potassium chloride was the principal potash source.

The low for the multiple-nutrient class of materials was 9.63 percent in Vermont and was due to a large tonnage of natural organics. The high of 64.53 percent in Hawaii was due to the ammonium phosphates (11-48 and 21-53).

The weighted averages of the total nutrient contents of materials, shown in column 10, table 7, are indicative of the relative grades of products consumed in principal quantities in each designated area. It is evident from these averages that products consumed in the New England region have, on the average, a lower primary-nutrient content than materials consumed in any other region.

Primary Plant Nutrients

During the year ended June 30, 1959, fertilizers used in the United States contained 7,415,713 tons of primary plant nutrients (N, available P_2O_5, K_2O) (table 11). This represented a substantial increase in primary nutrients (903,326 tons, 13.9 percent) over the preceding year. Consumption of nitrogen was 2,672,332 tons, an increase of 387,973 tons (17.0 percent); available P_2O_5 2,551,287 tons or 258,397 tons (11.3 percent) more; and K_2O 2,192,094 tons or 256,956 tons (13.3 percent) above 1957-58.

Mixtures supplied 999,963 tons or 37.4 percent of the N, 2,014,315 tons or 79.0 percent of the available P_2O_5, and 1,914,305 tons or 87.3 percent of the K_2O. These quantities represented increases of 16.9, 12.0, and 13.7 percent, respectively, over the preceding year.

Materials used for direct application supplied 1,672,369 tons or 62.6 percent of the N, 536,972 tons or 21.0 percent of the available P_2O_5,

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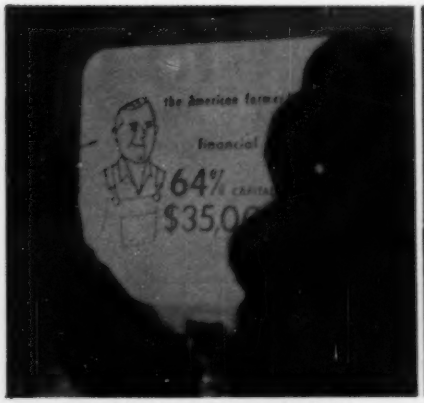

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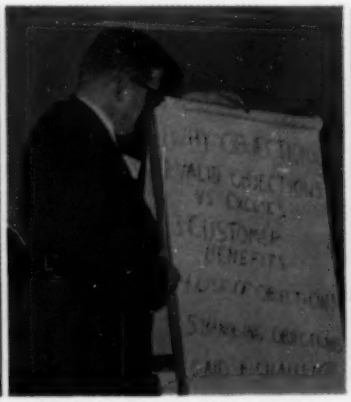

Selling approaches were carefully analyzed . . . from "why people buy" to "getting them to sign on the dotted line." This program has generated impressive sales results in many areas.

Markets were analyzed for sales potential. Participating executives saw demonstrations of practical selling ideas that help keep costs in line, manufacturing forecasts realistic and product specifications suited to area needs.

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The IMC Customer Meetings will present technical information in the same interesting and informative manner used in the popular sales training meetings last year. Response to those meetings was immediate and enthusiastic. In 10 cities throughout the country, these two-day sessions were warmly received. Leading fertilizer executives made comments like this:

"This could revolutionize the fertilizer industry in marketing and merchandising. I'm sure glad I attended."

"Our time was well spent. This was the best meeting I can remember attending. It covered fundamentals, not flashy promotion."

"Our group was amazed by the number of good ideas and principles presented. Coverage was excellent."

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Minneapolis, Minn.	Monday, Tuesday, October 24, 25
Indianapolis, Ind.	Wednesday, Thursday, October 26, 27
Baltimore, Md.	Wednesday, Thursday, November 9, 10
New York, N.Y.	Monday, Tuesday, November 14, 15
Raleigh, N.C.	Wednesday, Thursday, November 16, 17
Toledo, O.	Monday, Tuesday, November 21, 22
Winter Park, Fla.	Monday, Tuesday, November 28, 29
Montgomery, Ala.	Wednesday, Thursday, November 30, December 1
Kansas City, Kan.	Monday, Tuesday, December 5, 6
Tyler, Tex.	Monday, Tuesday, December 12, 13
Jackson, Miss.	Wednesday, Thursday, December 14, 15

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These sessions . . . forerunners of the 1960 technical seminars . . . were part of IMC's continuing program of help to the fertilizer industry.

FO-2-01

and 277,789 tons or 12.7 percent of the K_2O. These quantities represented increases of 17.0, 8.6, and 10.6 percent, respectively, from 1957-58.

Although the totals of primary nutrients were substantially higher for both mixtures and materials in 1958-59 than in 1957-58 as shown in table 12, consumption of one or more of the nutrients supplied either by mixtures or by materials decreased in 31 of the 51 areas. In 16 of these 31 areas, however, the decrease in the quantity of a nutrient supplied either by a mixture or a material was offset by an increase of that nutrient in the other category. In the other 15 areas the decrease of a nutrient in one category was not offset by an increase in the other category. Nitrogen decreased in three such areas, available P_2O_5 in eight, and K_2O in nine. These net decreases occurred mostly in the New England and Mountain regions.

Compared with 1957-58, the use of nitrogen increased 387,973 tons, of which 144,759 tons were supplied by mixtures and 243,214 tons by materials. The increase in nitrogen was largest in the West North Central region (35.5 percent), followed by the East North Central region (26.2 percent) and the South Atlantic region (15.6 percent), and the smallest was in the New England region (6.8 percent). In 1958-59, consumption of nitrogen in the West North Central region (476,383 tons) exceeded that in the South Atlantic region (475,723 tons) for the first time. The largest use of nitrogen in mixtures, however, was still in the South Atlantic region.

Compared with 1957-58, the use of available P_2O_5 increased 258,397 tons, of which 215,725 tons were supplied by mixtures and 42,672 tons by materials. As in the case of nitrogen, increases in available P_2O_5 were largest in the West North Central region (23.3 percent), East North Central region (9.7 percent), and South Atlantic region (12.0 percent). Use decreased, however, in the New England region by 1.6 percent.

Compared with 1957-58, the use of K_2O increased 256,956 tons of which 230,395 tons were supplied by mixtures and 26,561 tons by materials. Increases ranged from 6.9 percent in the Middle Atlantic region to 29.3 percent in the West North Central region. In the New England and Mountain regions the totals consumed, however, were about one percent less.

The quantities of primary nutrients in the principal kinds of fertilizers used in 1958-59 (table 1) are shown by regions in table 13. More than one-half of the total consumption of nitrogen was as N-P-K mixtures and anhydrous ammonia—which supplied, respectively, 34.0 and 20.9 percent. These two commodities accounted for over 50 percent of the nitrogen consumed in each region except the Mountain and the Pacific. In these two, the principal use of nitrogen was as direct-application materials with more than one-half being used as anhydrous ammonia and amonium nitrate in the Mountain region and as aqueous and anhydrous ammonia

Table 10.—Ammoniated phosphates consumed in States and regions as direct-application materials, by grades, year ended June 30, 1959[1]

Tons

State and region	Grade[2]				
	11-48	13-39	16-20	27-14	21-53
Maine	0	0	0	0	10
New England	**0**	**0**	**0**	**0**	**10**
New York	39	0	0	0	8
New Jersey	104	0	0	0	91
Pennsylvania	1,144	0	0	0	106
Delaware	2	0	0	0	0
Maryland	76	0	0	0	5
West Virginia	21	0	0	0	0
Middle Atlantic	**1,386**	**0**	**0**	**0**	**210**
Virginia	7	0	0	0	279
North Carolina	0	0	0	0	68
South Carolina	0	0	0	0	18
Georgia	0	0	0	0	263
Florida[3]	28	0	0	0	6
South Atlantic	**35**	**0**	**0**	**0**	**634**
Ohio	3,540	10	7	0	645
Indiana	5,408	23	11	0	1,011
Illinois	3,646	300	276	0	1,616
Michigan	1,450	0	0	0	636
Wisconsin	174	37	0	0	268
East North Central	**14,218**	**370**	**294**	**0**	**4,176**
Minnesota	13,386	3,188	5,967	506	804
Iowa	2,429	3,250	10,264	838	707
Missouri	900	18	1,274	0	765
North Dakota	32,535	5,964	28,721	1,314	295
South Dakota	1,473	273	5,518	418	287
Nebraska	3,575	1,954	6,039	5	2,538
Kansas	970	9,804	38,188	0	341
West North Central	**55,268**	**24,451**	**95,971**	**3,081**	**5,737**
Kentucky	0	6	0	0	534
Tennessee	0	5	0	9	1,045
Alabama	0	0	0	0	474
Mississippi	0	0	395	0	529
East South Central	**0**	**11**	**395**	**9**	**2,582**
Arkansas	21	112	1,094	0	0
Louisiana[3]	67	24	3,027	0	0
Oklahoma	482	6,692	8,756	0	73
Texas	4,200	9,828	70,788	4	955
West South Central	**4,770**	**16,656**	**83,665**	**4**	**1,028**
Montana	3,305	84	6,094	328	0
Idaho	1,451	42	12,483	2,557	0
Wyoming	149	21	536	65	1,432
Colorado	475	992	783	18	5,157
New Mexico	560	1,393	4,484	0	435
Arizona	3,787	1,931	30,418	534	2,239
Utah	947	3	1,639	266	12
Nevada	11	30	957	15	5
Mountain	**10,685**	**4,496**	**57,394**	**3,783**	**9,280**
Washington	3,977	1,471	6,505	10,859	119
Oregon	1,710	1,089	22,842	157	86
California[3]	10,064	3,466	69,298	2,441	1,704
Pacific	**15,751**	**6,026**	**98,645**	**13,457**	**1,909**
Hawaii	1,405	0	145	0	1,412
Puerto Rico	0	0	250	0	2
United States	**103,518**	**52,010**	**336,759**	**20,334**	**26,980**

[1] No consumption was reported for States not listed. [2] Including the quantity of these grades reported as mixtures. [3] In addition, 101 tons of 4-16-0 grade specified as ammoniated superphosphate was consumed in Florida, 39 tons in Louisiana, and 2,018 tons of 3-18-0 grade in California.

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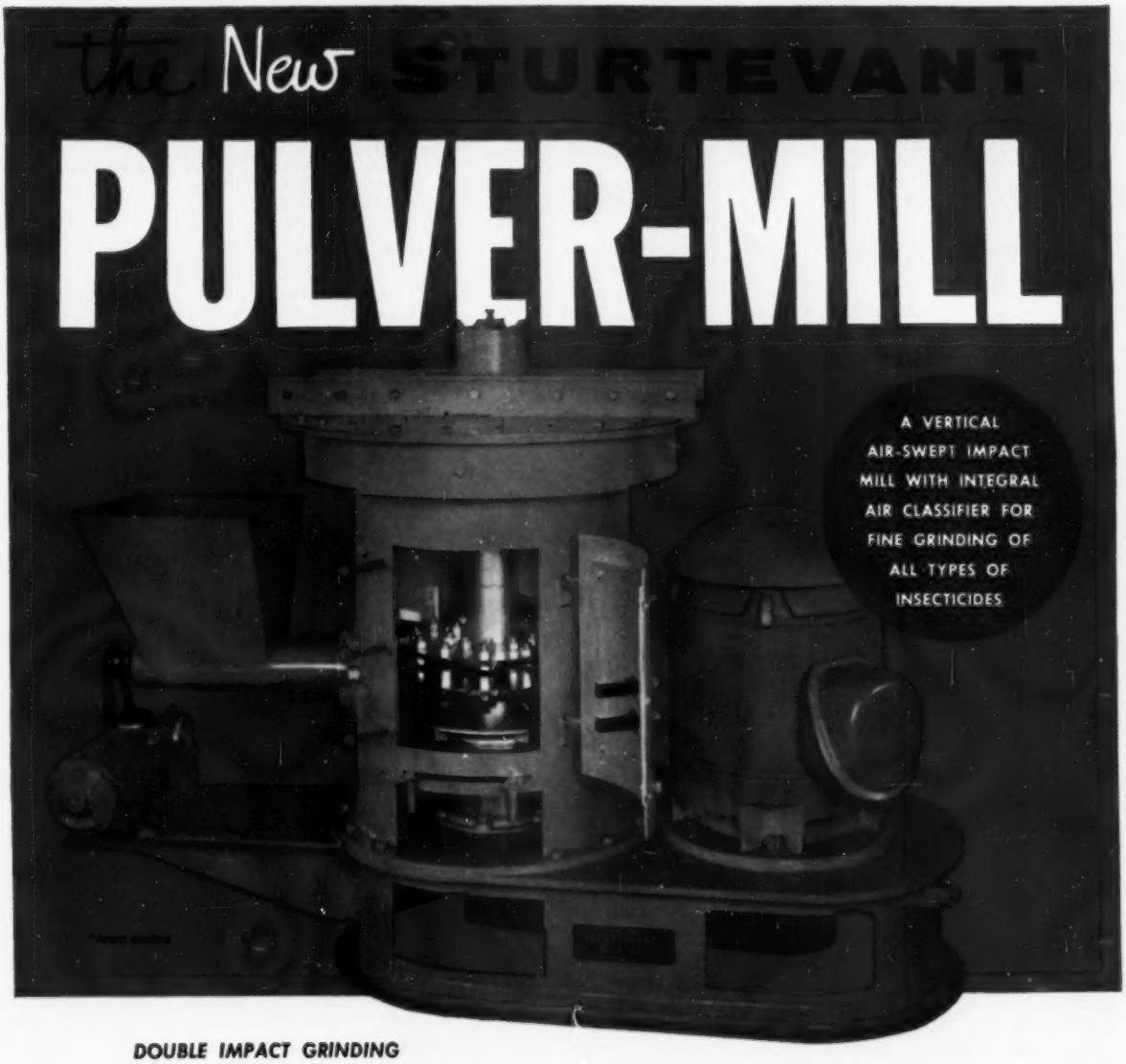

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Table 11.—Primary plant nutrients consumed in mixtures and in mixtures and materials combined, by State and region, year ended June 30, 1959

Tons

State and region	Consumption of nutrients in mixtures					Consumption of nutrients in mixtures and materials				
	N	P_2O_5		K_2O	Total N, available P_2O_5, and K_2O	N	P_2O_5		K_2O	Total N, available P_2O_5, and K_2O
		Available	Total				Available[1]	Total[2]		
Maine	14,347	20,593	21,192	21,378	56,318	15,137	21,202	21,833	21,552	57,891
New Hampshire	1,238	2,071	2,152	2,203	5,512	1,682	2,547	2,655	2,285	6,514
Vermont	2,151	5,613	5,789	6,158	13,922	2,712	8,545	8,845	6,403	17,660
Massachusetts	5,198	7,189	7,491	6,926	19,313	6,718	8,410	8,779	7,420	22,548
Rhode Island	986	1,513	1,584	1,531	4,030	1,143	1,603	1,681	1,567	4,313
Connecticut	4,500	6,075	6,428	6,406	16,981	5,960	7,606	8,041	7,139	20,705
New England	**28,420**	**43,054**	**44,636**	**44,602**	**116,076**	**33,352**	**49,913**	**51,834**	**46,366**	**129,631**
New York	36,394	65,428	67,911	56,531	158,353	46,271	72,767	75,644	58,213	177,251
New Jersey	13,535	24,621	25,345	23,787	61,943	17,006	25,969	26,800	24,852	67,827
Pennsylvania	33,104	74,039	76,811	70,518	177,661	40,657	81,138	85,352	72,406	194,201
Delaware	5,085	10,213	10,574	11,501	26,799	6,126	10,323	10,698	11,637	28,086
District of Columbia	292	361	392	230	883	347	415	449	242	1,004
Maryland	15,650	32,817	35,219	31,547	80,014	19,517	34,062	36,979	32,052	85,631
West Virginia	3,100	8,013	8,523	7,069	18,182	3,688	9,806	10,453	7,202	20,696
Middle Atlantic	**107,160**	**215,492**	**224,775**	**201,183**	**523,835**	**133,612**	**234,480**	**246,375**	**206,604**	**574,696**
Virginia	29,649	75,848	80,956	80,592	186,089	44,735	79,829	85,245	84,150	208,714
North Carolina	63,448	129,426	139,515	146,473	339,347	134,223	133,773	144,451	154,803	422,799
South Carolina	27,242	65,316	70,785	67,117	159,675	71,840	67,962	73,656	77,925	217,727
Georgia	52,723	125,796	132,969	140,582	319,101	119,962	128,453	135,999	144,785	393,200
Florida	78,715	85,627	104,461	118,837	283,179	104,963	90,641	113,738	123,977	319,581
South Atlantic	**251,777**	**482,013**	**528,686**	**553,601**	**1,287,391**	**475,723**	**500,658**	**553,089**	**585,640**	**1,562,021**
Ohio	60,010	143,947	148,585	128,644	332,601	83,940	153,405	159,997	134,572	371,917
Indiana	59,592	154,600	158,937	148,337	362,529	123,157	167,184	174,716	189,024	479,365
Illinois	48,719	107,036	111,386	90,230	245,985	130,983	161,377	314,118	155,040	447,400
Michigan	41,846	103,702	107,095	96,691	242,239	59,751	108,370	112,905	101,039	269,160
Wisconsin	19,105	68,280	70,255	87,409	174,794	28,974	70,813	73,792	97,946	197,733
East North Central	**229,272**	**577,565**	**596,258**	**551,311**	**1,358,148**	**426,805**	**661,149**	**835,528**	**677,621**	**1,765,575**
Minnesota	24,378	84,756	86,685	62,303	171,437	63,610	108,762	111,557	70,722	243,094
Iowa	30,925	81,398	84,852	56,238	168,561	93,739	117,532	123,714	66,595	277,866
Missouri	53,450	74,215	77,642	67,611	195,276	110,912	90,887	161,315	78,659	280,458
North Dakota	6,180	11,010	11,329	1,511	18,701	18,033	43,697	44,726	1,519	63,249
South Dakota	1,568	2,480	2,656	191	4,239	7,698	7,548	7,933	229	15,475
Nebraska	4,875	11,016	11,147	1,670	17,561	121,063	25,415	26,068	2,113	148,591
Kansas	11,291	23,078	23,741	5,556	39,925	61,328	49,056	50,831	6,526	116,910
West North Central	**132,667**	**287,953**	**298,052**	**195,080**	**615,700**	**476,383**	**442,897**	**526,144**	**226,363**	**1,145,643**
Kentucky	26,327	57,310	62,093	60,042	143,679	44,717	68,667	76,504	68,989	182,373
Tennessee	28,278	57,814	62,072	56,778	142,870	53,980	64,236	69,661	65,494	183,710
Alabama	29,485	69,099	75,053	83,692	182,276	84,051	76,904	83,346	89,153	250,108
Mississippi	20,129	32,198	34,497	29,569	81,896	113,975	48,528	51,135	39,217	201,720
East South Central	**104,219**	**216,421**	**233,715**	**230,081**	**550,721**	**296,723**	**258,335**	**280,646**	**262,853**	**817,911**
Arkansas	11,442	25,444	26,647	24,994	61,880	65,611	31,710	33,202	43,994	141,315
Louisiana	11,395	21,852	23,042	18,209	51,456	55,109	24,945	26,968	20,266	100,320
Oklahoma	6,547	14,036	14,566	5,603	26,186	13,148	27,763	29,813	5,937	46,848
Texas	27,022	50,185	52,248	24,946	102,153	148,692	88,312	94,862	26,302	263,306
West South Central	**56,406**	**111,517**	**116,503**	**73,752**	**241,675**	**282,560**	**172,730**	**184,845**	**96,499**	**551,789**
Montana	464	653	677	144	1,261	5,085	12,741	13,121	164	17,990
Idaho	2,533	2,732	2,821	167	5,432	25,933	18,711	19,718	621	45,265
Wyoming	214	288	305	40	542	3,281	3,592	3,681	60	6,933
Colorado	1,889	2,849	3,010	1,081	5,819	20,202	15,344	15,666	1,505	37,051
New Mexico	324	414	444	103	841	7,871	8,308	8,611	145	16,324
Arizona	3,845	5,020	5,226	1,204	10,069	49,438	19,261	19,701	1,837	70,536
Utah	834	982	1,050	202	2,018	6,914	5,877	6,096	242	13,033
Nevada	277	294	317	66	637	986	783	817	72	1,841
Mountain	**10,380**	**13,232**	**13,850**	**3,007**	**26,619**	**119,710**	**84,617**	**87,411**	**4,646**	**208,973**
Washington	4,719	6,912	7,198	3,960	15,591	64,739	17,628	18,148	7,068	89,435
Oregon	2,990	4,899	5,081	2,686	10,575	41,689	13,887	14,445	3,843	59,419
California	37,258	38,940	39,767	21,279	97,477	266,352[3]	94,067[3]	96,928[3]	33,110[4]	393,529
Pacific	**44,967**	**50,751**	**52,046**	**27,925**	**123,643**	**372,780**	**125,582**	**129,521**	**44,021**	**542,383**
Total	**965,268**	**1,997,998**	**2,108,521**	**1,880,542**	**4,843,808**	**2,617,648**	**2,530,361**	**2,895,393**	**2,150,613**	**7,298,622**
Hawaii	6,970	4,525	4,639	10,995	22,490	19,333	9,024	10,442	18,603	46,960
Puerto Rico	27,725	11,792	13,504	22,768	62,285	35,351	11,902	13,615	22,878	70,131
United States:										
1958-59	**999,963**	**2,014,315**	**2,126,664**	**1,914,305**	**4,928,583**	**2,672,332**	**2,551,287**	**2,919,450**	**2,192,094**	**7,415,713**
1957-58	**855,204**	**1,798,590**	**1,903,452**	**1,683,910**	**4,337,704**	**2,284,359**	**2,292,890**	**2,655,300[5]**	**1,935,138**	**6,512,387**
1956-57	**843,626**	**1,817,626**	**1,926,774**	**1,681,121**	**4,342,373**	**2,135,287**	**2,304,992**	**2,669,942**	**1,936,923**	**6,377,202**

[1] Includes, for quantities marketed as direct-application materials, an average content of 2 percent for the colloidal phosphate and 3 percent for the phosphate rock. [2] Includes, for quantities marketed as direct-application materials, an average content of 22.04 percent for the colloidal phosphate and 32.02 percent for the phosphate rock. [3] Includes an estimate of 4,185 tons marketed as dried manures. [4] Includes an estimate of 7,452 tons marketed as dried manures. [5] Revised by addition of 41 tons in Rhode Island.

Table 12.—Change in consumption of primary nutrients, year ended June 30, 1959, compared with preceding year

Tons

State and region	Mixtures					Materials				
	N	P_2O_5		K_2O	Total (N, avail. P_2O_5, and K_2O)	N	P_2O_5		K_2O	Total (N, avail. P_2O_5, and K_2O)
		Available	Total				Available	Total		
Maine	411	121	50	— 632	— 100	193	— 453	— 452	59	— 201
New Hampshire	146	24	36	— 6	164	90	12	23	— 30	72
Vermont	220	— 544	— 557	— 449	— 773	83	— 154	— 127	65	— 6
Massachusetts	272	— 41	— 27	212	443	78	124	60	52	254
Rhode Island	29	— 76	— 73	— 49	— 96	— 23	4	— 1	— 5	— 24
Connecticut	671	207	277	312	1,190	— 54	— 32	— 51	— 37	— 123
New England	**1,749**	**— 309**	**— 294**	**— 612**	**828**	**367**	**— 499**	**— 548**	**104**	**— 28**
New York	— 33	— 989	—1,028	— 603	—1,625	219	— 293	— 383	— 34	— 108
New Jersey	2,528	3,577	3,650	3,339	9,444	548	47	37	488	1,083
Pennsylvania	2,358	2,406	2,486	3,183	7,947	1,025	114	— 21	576	1,715
Delaware	952	1,116	1,118	1,797	3,865	259	— 5	— 52	32	286
District of Columbia	69	77	90	69	215	2	9	12	2	13
Maryland	2,966	3,393	4,142	4,225	10,584	1,194	222	250	83	1,499
West Virginia	145	132	141	225	502	— 54	431	469	9	386
Middle Atlantic	**8,985**	**9,712**	**10,599**	**12,235**	**30,932**	**3,193**	**525**	**312**	**1,156**	**4,874**
Virginia	3,296	7,389	7,940	11,343	22,028	2,236	923	725	679	3,838
North Carolina	9,346	15,727	16,951	19,417	44,490	14,252	802	1,127	854	15,908
South Carolina	5,551	12,393	14,092	13,503	31,447	8,705	58	31	1,257	10,020
Georgia	9,075	19,794	20,890	27,759	56,628	10,717	—1,467	—2,601	102	9,352
Florida	874	—1,902	—2,202	2,004	976	323	49	770	790	1,162
So. Atlantic	**28,142**	**53,401**	**57,671**	**74,026**	**155,569**	**36,233**	**365**	**52**	**3,682**	**40,280**
Ohio	6,354	6,759	5,062	2,534	15,647	6,402	972	271	254	7,628
Indiana	7,596	10,852	10,585	13,286	31,734	18,879	1,022	—1,878	—2,251	17,650
Illinois	11,122	22,684	23,374	10,541	44,347	23,189	863	—3,543	4,409	28,461
Michigan	7,378	11,079	10,916	9,924	28,381	4,940	518	348	— 608	4,850
Wisconsin	1,617	3,803	2,934	7,302	12,722	1,164	— 279	— 249	4,040	4,925
East North Central	**34,067**	**55,177**	**52,871**	**43,587**	**132,831**	**54,574**	**3,096**	**—5,051**	**5,844**	**63,514**
Minnesota	5,121	15,449	15,196	14,659	35,229	9,041	135	127	1,046	10,222
Iowa	7,568	17,850	18,621	12,629	38,047	20,780	6,847	6,863	1,964	29,591
Missouri	15,103	17,394	18,182	18,092	50,589	11,866	1,731	7,893	— 139	13,458
North Dakota	2,137	2,203	2,280	— 161	4,179	2,973	5,011	5,340	6	7,990
South Dakota	152	37	44	47	236	1,184	— 96	— 37	22	1,110
Nebraska	1,456	3,728	3,767	371	5,555	25,453	1,887	1,932	222	27,562
Kansas	3,488	6,523	6,703	2,111	12,122	18,343	5,009	5,490	362	23,714
West North Central	**35,025**	**63,184**	**64,793**	**47,748**	**145,957**	**89,640**	**20,524**	**27,608**	**3,483**	**113,647**
Kentucky	3,597	5,284	5,826	6,761	15,642	3,186	2,370	2,114	1,348	6,904
Tennessee	5,499	9,100	9,641	10,254	24,853	5,574	— 473	136	1,353	6,454
Alabama	4,447	—8,523	—7,850	11,889	7,813	7,545	—1,119	—1,741	307	6,733
Mississippi	4,464	6,729	7,132	8,443	19,636	1,191	1,965	187	938	4,094
East South Central	**18,007**	**12,590**	**14,749**	**37,347**	**67,944**	**17,496**	**2,743**	**696**	**3,946**	**24,185**
Arkansas	2,227	4,683	4,870	5,957	12,867	10,763	737	779	4,857	16,357
Louisiana	1,059	1,815	1,911	1,235	4,109	218	— 274	— 715	241	185
Oklahoma	1,801	3,438	3,537	1,314	6,553	1,447	3,774	4,142	40	5,261
Texas	2,593	3,837	3,877	2,012	8,442	1,576	— 281	105	— 322	973
West North Central	**7,680**	**13,773**	**14,193**	**10,518**	**31,971**	**14,004**	**3,956**	**4,311**	**4,816**	**22,776**
Montana	— 156	— 279	— 292	84	—351	783	1,056	1,077	— 13	1,826
Idaho	1,049	1,116	1,137	— 31	2,134	2,897	3,610	3,762	— 169	6,338
Wyoming	27	1	1	12	40	443	571	592	16	1,030
Colorado	148	219	220	— 20	347	1,819	775	797	110	2,704
New Mexico	— 9	— 150	— 146	— 16	— 175	— 671	899	981	— 41	187
Arizona	— 539	— 914	— 938	— 62	—1,515	1,537	15	32	68	1,620
Utah	462	354	378	— 2	814	—1,140	—1,024	—1,046	6	—2,158
Nevada	44	54	68	6	104	16	— 195	— 210	— 8	— 187
Mountain	**1,026**	**401**	**428**	**— 29**	**1,398**	**5,684**	**3,707**	**3,985**	**— 31**	**11,360**
Washington	449	256	278	— 76	629	—2,039	— 4	— 99	818	—1,225
Oregon	175	301	319	244	720	2,009	980	1,038	48	3,037
California	4,020	4,210	4,267	1,409	9,639	23,746	3,937	4,868	845	28,528
Pacific	**4,644**	**4,767**	**4,864**	**1,577**	**10,988**	**23,716**	**4,913**	**5,807**	**1,711**	**30,340**
Total	**139,325**	**212,696**	**219,876**	**226,397**	**578,418**	**244,907**	**41,330**	**39,172**	**24,711**	**310,948**
Hawaii	— 586	1,116	1,079	— 149	381	2,002	1,611	2,039	1,918	5,531
Puerto Rico	6,020	1,913	2,257	4,147	12,080	—3,695	— 269	— 273	— 68	—4,032
United States	**144,759**	**215,725**	**223,212**	**230,395**	**590,879**	**243,214**	**42,672**	**40,938**	**26,561**	**312,447**

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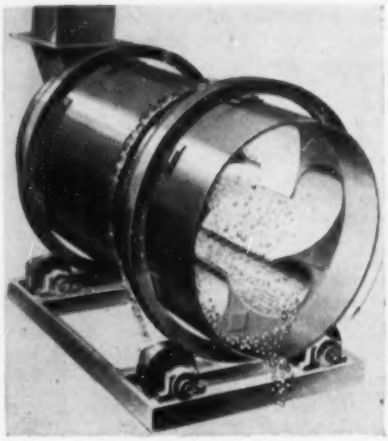

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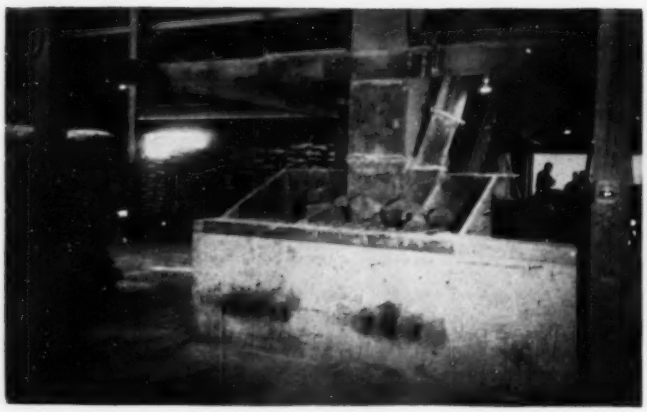

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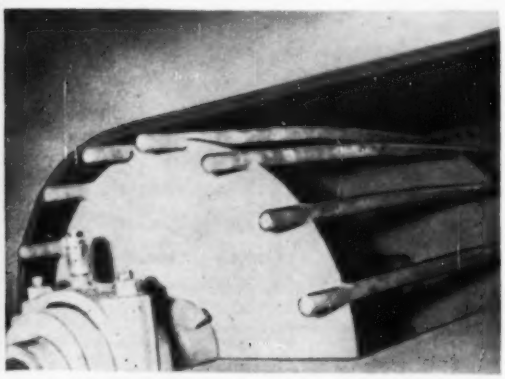

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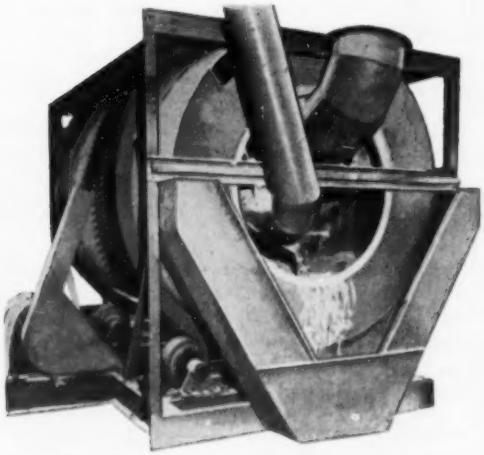

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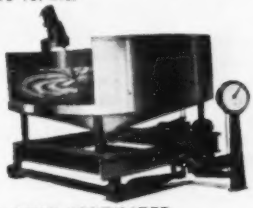

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in the Pacific region.

More than 69 per cent of the total consumption of available P_2O_5 was as N-P-K mixtures. In all regions except the Mountain and Pacific regions, from 50 percent (West North Central) to 91 percent (South Atlantic) of the available P_2O_5 consumed was supplied in such mixtures. In the Mountain region superphosphate, grades over 22 percent P_2O_5, and the N-P grades of mixtures and materials supplied, respectively, 45.3 and 37.2 percent whereas in the Pacific region a greater diversification of fertilizers was used.

Seventy-seven percent of the total consumption of K_2O was as N-P-K mixtures. The regional proportions ranged from 62 percent (Pacific) to 86 percent (Middle Atlantic).

The substantially higher increase of 14 percent in the national consumption of primary plant nutrients recorded in 1958-59 over the previous year, appears to be attributable, at least in part, to an overall increase of 17 percent in the sum of the planted acreages of corn and cotton (which followed changes in acreage allotments) as calculated from the 1959 Annual Summary of Crop Production (Crop Reporting Board, U. S. Department of Agri-

Table 13.—Primary plant nutrients consumed in regions and United States as mixtures and as direct-application materials, by kinds, year ended June 30, 1959

Tons

Kind	New England	Middle Atlantic	South Atlantic	East North Central	West North Central	East South Central	West South Central	Mountain	Pacific	Hawaii and Puerto Rico	United States
Nitrogen											
MIXTURES: N-P-K	28,414	107,097	221,582	224,060	109,696	101,042	51,797	4,305	31,397	30,122	909,512
N-P	6	40	290	5,189	22,962	2,496	4,350	6,072	13,252	79	54,736
N-K	0	23	29,905	23	9	681	259	3	318	4,494	35,715
MATERIALS:											
Ammonia, anhydrous	0	2,482	23,376	72,152	138,395	49,696	119,746	37,368	115,319	644	559,178
Ammonia, aqua	0	[1]	0	2,467	2,836	1,292	1,383	5,939	72,711	10,312	96,940
Ammonium nitrate	1,746	11,701	52,516	54,458	112,132	98,103	41,176	25,881	31,706	0	429,419
Ammonium nitrate-limestone mixtures	12	288	54,735	94	6	7,865	524	43	65	5,863	69,495
Ammonium sulfate	92	1,481	1,775	23,785	2,002	2,928	17,269	12,472	47,653	0	109,457
Bonemeal: raw and steamed	44	112	42	54	8	12	14	1	68	0	355
Calcium cyanamide	138	1,473	1,973	167	0	1,510	1,654	127	1,575	0	8,617
Calcium nitrate	2	[1]	1,784	0	0	183	69	1,267	4,753	16	8,074
Natural organics	1,267	1,801	1,615	2,177	809	121	243	281	6,145	8	14,467
Nitrogen solutions	447	2,120	39,415	30,232	57,852	4,755	8,017	3,648	12,538	0	159,024
Phosphate products	2	203	141	2,591	27,148	611	16,194	13,953	22,064	517	83,424
Potassium products	16	[1]	2,896	[1]	[1]	101	0	0	1	1	3,015
Sodium nitrate	275	1,879	42,062	194	63	23,646	9,253	49	34	20	77,475
Urea	720	2,251	1,304	8,189	2,270	1,648	10,514	8,023	12,672	2,606	50,197
Other chemical nitrogen products	171	661	312	973	195	33	98	278	509	2	3,232
Total nitrogen	**33,352**	**133,612**	**475,723**	**426,803**	**476,383**	**296,723**	**282,560**	**119,710**	**372,780**	**54,684**	**2,672,332**
Available P_2O_5											
MIXTURES: N-P-K	38,578	194,114	455,524	517,048	222,806	186,170	95,451	6,216	35,188	15,103	1,766,198
N-P	7	114	130	20,394	47,500	1,193	8,254	7,003	15,166	230	99,991
P-K	4,469	21,264	26,359	40,123	17,647	29,058	7,812	13	397	984	148,126
MATERIALS:											
Ammonium phosphate: 11-48	0	659	17	6,926	26,560	0	2,270	5,224	7,543	679	49,878
Ammonium phosphate: 13-39	0	0	0	148	9,638	4	6,493	1,812	2,347	0	20,442
Ammonium phosphate sulfate: 16-20	0	0	0	65	19,810	84	17,272	11,823	20,783	81	69,918
Ammonium phosphate nitrate: 27-14	0	0	0	0	452	1	1	562	1,308	0	2,324
Basic slag	0	0	1,653	2	0	10,453	196	0	0	0	12,304
Bonemeal: raw and steamde	379	1,002	447	408	61	105	92	8	379	0	2,881
Calcium metaphosphate	0	334	1,701	2,335	13,962	9,327	199	125	19	0	28,002
Diammonium phosphate: 21-53	5	113	344	2,257	3,037	1,394	560	5,085	1,018	761	14,574
Natural organics	806	1,093	669	2,163	803	73	142	195	5,686	7	11,637
Phosphate rock and colloidal phosphate	11	202	516	15,851	7,118	476	580	6	54	124	24,938
Phosphoric acid	0	0	0	0	95	0	1,262	5,022	5,923	0	12,302
Potassium products	14	[1]	6	0	[1]	[1]	0	0	0	0	20
Superphosphate: 22% and under	5,439	14,738	10,367	11,298	9,336	17,160	12,604	3,219	16,936	1,176	102,273
Superphosphate: over 22%	176	847	2,761	42,006	64,072	2,837	19,533	38,304	12,471	1,745	184,752
Other phosphate products	29	0	164	125	0	0	9	0	364	36	727
Total available P_2O_5	**49,913**	**234,480**	**500,658**	**661,149**	**442,897**	**258,335**	**172,730**	**84,617**	**125,582**	**20,926**	**2,551,287**
K_2O											
MIXTURES: N-P-K	38,500	177,415	479,415	496,163	178,538	197,620	65,301	2,994	27,288	26,037	1,689,271
P-K	6,102	23,744	40,073	55,124	16,533	31,597	8,192	11	430	1,235	183,041
N-K	0	24	34,113	24	9	864	259	2	207	6,491	41,993
MATERIALS:											
Lime-potash mixtures	0	1	1,293	[1]	0	470	0	0	0	0	1,764
Manure salts	0	0	98	0	0	0	15	0	0	0	113
Natural organics	324	447	371	592	108	30	75	54	8,014	1	10,016
Potassium chloride	1,133	3,851	24,400	123,705	30,747	28,729	22,258	957	4,288	6,772	246,840
Potassium magnesium sulfate	20	274	618	455	209	279	291	33	392	2	2,573
Potassium nitrate	57	0	47	1	0	0	0	0	1	0	106
Potassium sodium nitrate	0	0	2,733	0	0	97	23	0	[1]	1	2,854
Potassium sulfate	64	841	2,330	1,540	215	3,167	3	595	3,399	942	13,096
Other potassium products	166	7	149	17	4	[1]	82	0	2	0	427
Total K_2O	**46,366**	**206,604**	**585,640**	**677,621**	**226,363**	**262,853**	**96,499**	**4,646**	**44,021**	**41,481**	**2,192,094**
GRAND TOTAL: N, avail. P_2O_5, K_2O	**129,631**	**574,696**	**1,562,021**	**1,765,575**	**1,145,643**	**817,911**	**551,789**	**208,973**	**542,383**	**117,091**	**7,415,713**

[1] Less than 0.5 tons.

culture, December 1959). The percentage increase in consumption of primary plant nutrients in 1958-59 compared with 1957-58 was highest in those regions in which increases in the sum of the planted acreages of corn and cotton was highest (West North Central) and lowest in those regions in which there was little change in the sum of the planted acreages of these crops (New England). The planted acreages of these crops increased 22 percent and that of the primary plant nutrients 29 percent in the West North Central region. In the South Atlantic region the acreages increased 14 percent with a corresponding increase in primary nutrients, whereas, in the New England region these changes were three and one percent, respectively.

HONORS

Elbert N. Carvel, president of Valiant Ferilizer Co., who finished a term as Governor of Delaware eight years ago, was recently nominated by acclamation to be Democratic candidate for the post this year.

• • •

Frank Cooper, manager of American Cyanamid's agricultural services center at Princeton, N. J., has been named to the US Chamber of Commerce agriculture committee.

• • •

Twelve students at leading mining and agricultural colleges have been named winners of the first Louis Ware senior-year scholarships. The $1,000 awards are sponsored by International Minerals & Chemical Corporation, Skokie, Illinois.

In addition, the six winners in each category become eligible to compete for $3,000-a-year, three-year fellowships, one in mining and one in agriculture.

The scholarship-fellowship award program, announced last December, was named in honor of the IMC board chairman who was for 20 years president of the company.

Soil Acidity Hurts S. C. Farms

Halt of the money spent for fertilizer by South Carolina farmers is lost because of excessive soil acidity.

Dr. H. P. Cooper, dean emeritus, Clemson College Agricultural Experiment Station says that 80 percent of the cropland in the state is too acid for efficient fertilizer use.

Not only are farmers losing money on their fertilizer investment, but rewards of higher crop yields.

Industry Meeting Calendar

DATE	EVENT	LOCATION	CITY
Sept. 29-30	Northeast Fertilizer Conference	Hotel Hershey	Hershey, Pa.
Oct. 5-6	Southeast Fertilizer Conference	Biltmore Hotel	Atlanta, Ga.
Oct. 13-14	Fertilizer Control Officials	Shoreham Hotel	Washington, D. C.
Oct. 17-18	Fertilizer Industry Safety Section	Morrison Hotel	Chicago, Ill.
Oct. 18-19	Fertilizer Salesmen School	Country Club Inn	Danville, Va.
Oct. 25-26	Fertilizer Salesmen School	Va. Truck Ext. Sta.	Norfolk, Va.
Oct. 26-27	Far West Regional Safety School	Hacienda Motel	Fresno, Calif.
Nov. 2-4	Fertilizer Industry 'Round Table'	Mayflower Hotel	Washington, D. C.
Nov. 3-4	Pacific N.W. Plant Food Assn.	Boise	Boise, Idaho
Nov. 8-9	Southwest Regional Safety School	Jung Hotel	New Orleans, La.
Nov. 9-11	National Fertilizer Solutions Assn.	Peabody Hotel	Memphis, Tenn.
Nov. 13-15	California Fertilizer Association	del Coronado Hotel	Coronado, Calif.
	1961		
Jan. 11-13	Agricultural Ammonia Institute	Peabody Hotel	Memphis, Tenn.
Feb. 16-17	Industry-Agronomist Meet	Edgewater Beach Hotel	Chicago, Ill.

PERFORMANCE PROVED

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Is Now On Stream

Quotes on three recent projects:

PLANT #1—Fla.: "...our impression was that we could not compete here...However, we investigated the plant at Hopkinsville, Kentucky. We were also impressed with the new development work which your company has been doing...we decided to enter the liquid fertilizer business...We can now state that we made a wise choice..."

PLANT #2—Ark.: "...plant is...under operation...very best choice we could make...appreciate your continued assistance...will highly recommend you..."

PLANT #3—Okla.: "...as construction nears completion we are pleased that we decided to order our liquid fertilizer plant from J. C. Carlile Corp."

WRITE for copies of the letters from which the above quotations are taken. A typical Carlile Process liquid fertilizer plant utilizes wet process phosphoric acid to produce 15 to 35 tons/hr. of 8-24-0 liquid fertilizer, designed to your market and built on a performance-bond turnkey basis. Ask for complete literature and quotation.

Write for information on:

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- AMMONIUM PHOSPHATE (liquid)
- AMMONIUM PHOSPHATE (dry)
- AMMONIUM SULPHATE
- COMPLETE COMPLEX FERTILIZER
- LIQUID COMPLETE FERTILIZER (Wet Process Acid, or Normal and Super Phosphoric Acid)
- SINGLE SUPER PHOSPHATE
- SULPHURIC ACID
- TRIPLE SUPER PHOSPHATE
- WET PROCESS PHOSPHORIC ACID

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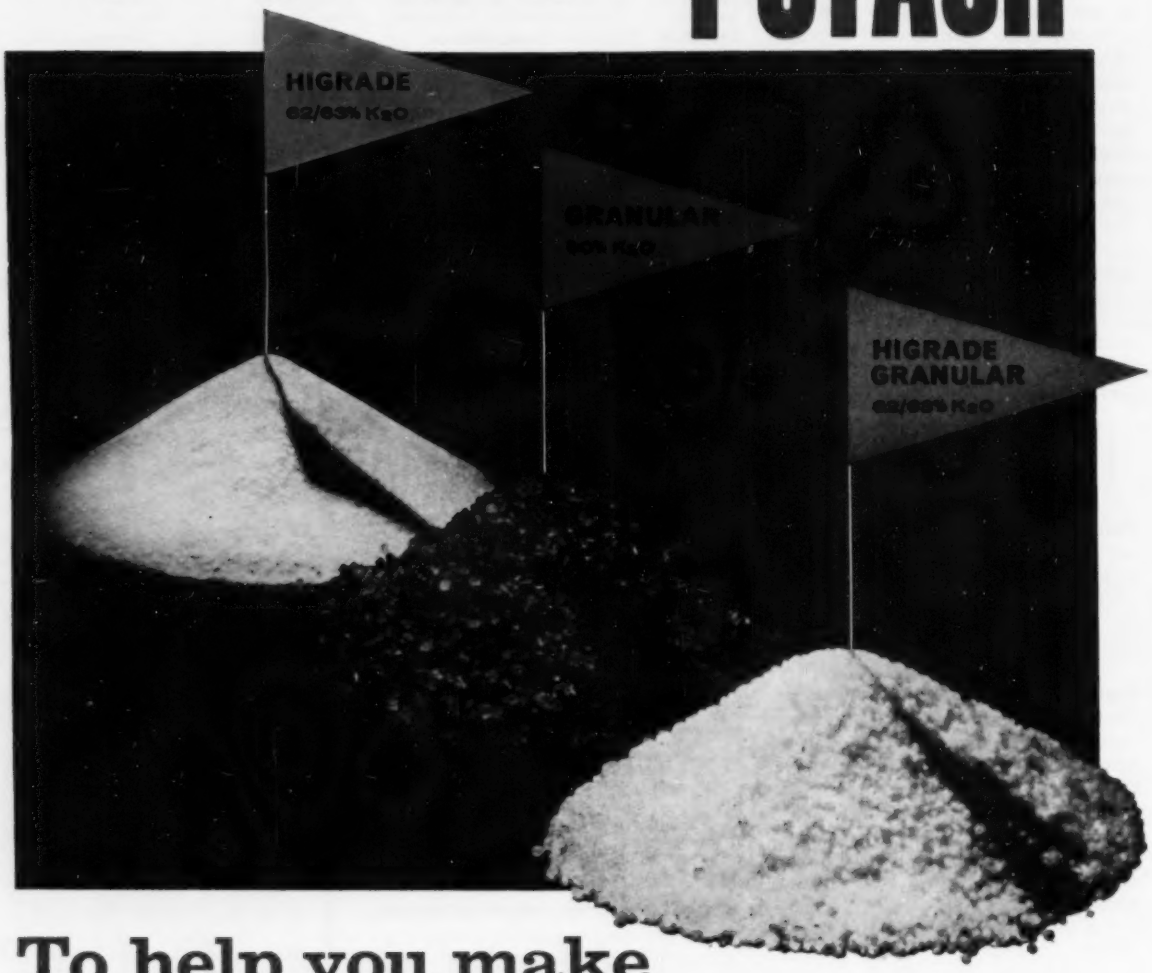

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Here's boron at lowest cost per unit! This highly concentrated source of B_2O_3 has a 178% borax equivalent. It can save dollars for you on costs of handling... storage... and transportation. It can also improve the physical condition of your mixed fertilizers.

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Here is potash you can depend upon—for highest quality—for maximum freedom from caking in storage and handling. Take your choice of three types; all readily available for immediate shipment. You'll find each to be ideally sized to meet your current manufacturing requirements.

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The International Scene

F.A.O.

Reports 7% fertilizer use increase

A 7 per cent increase in worldwide consumption of fertilizers last year is reported in a Food and Agriculture Organization study on the subject. The FAO Review states that the evident excess of production capacity caused some anxiety in some quarters, but "its main effect has been to promote use wherever possible."

The best prospects for further expansion in consumption increases are stated to be offered by China and India. In 1958-59 Europe and Northern and Central America produced about 88 per cent, and consumed 81 per cent of the world total supply of fertilizers.

Europe accounted for 56.6 per cent and Central America for 31 per cent of the world's total production. But both production and consumption of fertilizers are increasing at a remarkable rate in Asia. However, the biggest net rise in consumption of all—2.9m. tons last year more than in 1953-54—was that of Europe. Germany has become the world's largest exporter of nitrogenous fertilizers with 422,000 tons exported in 1958-59.

Japan, the U. S., Chile and Italy come next. Britain's exports amounted to 50,000 tons in 1958-1959 and were considerably lower than in 1957-58. Belgium was the largest exporter of phosphate fertilizers, followed by the U. S. Luxemburg and the Netherlands. Last year Eastern Germany was the world's largest exporter of potash fertilizers.

The combined world output of nitrogenous, phosphoric acid and potash fertilizers was 24.3m. tons—8 per cent more than in the previous year. Europe is still by far the largest net exporter of all fertilizers, whereas all the other continents, including America, are still net importers.

ARGENTINA

High relative cost cuts fertilizer use

Argentine consumption of fertilizers declined 44 percent in 1959 to approximately 60,000 metric tons, 6,000 tons N, 4,000 tons P_2O_5, and 2,000 tons K_2O. The high cost of fertilizers in relation to prices for farm products has retarded any increase in use for several years. Argentina depends on imports for most of its chemical fertilizers. The price disparity was accentuated in 1959 by Argentina's peso-stabilization program, which abolished the official exchange rate of 18 pesos to the dollar and established import surcharges of 20 and 40 percent, depending upon the type of fertilizer.

About half of the fertilizer consumed in 1959 was of locally produced natural organics, such as marine bird guano, oilseed meals, and slaughterhouse wastes (bone meal, dried blood, etc.). Superphosphate was produced sporadically, but none has been made in the last 2 years because of high costs and difficulties in obtaining sulfuric acid. Domestic ammonium sulfate first became available early in 1960 when the San Nicolas steel mill began operations.

The potential Argentine fertilizer market is estimated by authorities at 10 to 15 times the current use, about 750,000 tons. However, the outlook is for only a small increase in fertilizer consumption in the 1960-61 crop year. Prices for farm products rose during 1959, but lagged far behind the cost of fertilizers. Increased use of fertilizers on pasturelands is foreseen as a result of the "Operation Beef" program to promote greater return from livestock. Expected reduction of import surcharges and other assistance in lowering prices and promoting sales may provide some incentive for greater use of fertilizers.

ECUADOR

Survey reports favorable investment climate

A U. S. technical survey team, headed by George B. Beitzel, retired president and a director of Pennsalt Chemicals, Inc., Philadelphia, has reported on a survey of Ecuadoran market potentials and production capabilities for fertilizers, sulfuric acid, and caustic soda.

The survey, undertaken at the instigation of the Office for Private Enterprise of the International Cooperation Administration (ICA) as a cooperative effort of that agency and the Ecuadoran Government, describes the bases upon which markets were evaluated and details the cost and profit estimates involved in producing the materials.

The survey team found the investment climate in Ecuador to be quite favorable. The country's financial position is sound, and its fiscal policies are respected throughout the world. The Government passed an Industrial Development Law in 1957, which provides certain incentives for establishment of private enterprises named in an essentiality list. Fertilizers, sulfuric acid, and caustic soda stand high on this list.

The team report indicates that production of ammonia is not feasible at this time because of insufficient raw material and the limited market anticipated for the next 5 years. However, a sulfuric acid, ammonium sulfate complex appears to offer prospects of profitable operation and would provide a basis for developing further chemical enterprises. A caustic-soda-chlorine plant also is considered feasible even though the present market for chlorine products is small.

Copies of the team's report may be obtained, without charge, from the Trade Development Division, Bureau of Foreign Commerce, U. S. Department of Commerce, Washington 25, D. C., where inquiries for further information also may be directed.

INDIA

Fertilizer an active subject

The United Nations' technical assistance programme will finance in India this year a survey of the fertilizer industry, it is learned here.

The survey will start about the end of the year and go on into 1961. It will report on types of fertilizer plants required for different kinds of fertilizers proposed to be produced in the third five-year plan period.

* * *

The Government of India reportedly has reached a decision on a new price policy for fertilizers.

Under the decision, according to press reports, a pool price will be established from time to time which will assure equal selling prices for fertilizers of comparative quality, whether produced by public or private sectors.

This decision is of special interest to prospective private foreign investors who have indicated interest in collaborating with Indian interests in the establishment of fertilizer plants in India.

Approximately 25 companies in

the United States, Great Britain, and several European countries, who had asked for a clarification of the Government's price policy before proceeding further, are receiving information on the decision.

Confirmation of the report is being sought from the Government of India.

• • •

The Union Food and Agriculture Minister has said that encouragement would be given by the Government to the private sector for the manufacture of fertilizers. Should the private sector be inclined to take up production of more than 200,000 tons of nitrogenous fertilizer now assigned to it, the Government of India would be prepared to consider favourably specific proposals, he added.

JAPAN

Price problem upset producers

Japanese fertilizer producers are looking to the government to help them hold their big market in Taiwan by pushing through an agreement with the Nationalist Chinese Government on the purchase of Taiwan rice by Japan.

The fertilizer industry's concern arises from the recent purchase by Taiwan of 10,000 tons of ammonium sulfate from Italy, previously, Nationalist China took all of its ammonium sulfate requirements from Japan in exchange for Taiwan rice.

The biggest source of worry, however, was that Italy had sold its product at a price slightly above $30, f.o.b. per ton—a figure about $11 under what has been quoted by Japan up to now.

KOREA

Fertilizer tax must stand

The Finance Ministry has notified the Ministry of Agriculture and Forestry that the law does not allow for elimination of the 150-hwanto-$1 exchange tax on fertilizer imported with aid funds through the Governmental fertilizer distribution program.

The Agriculture Ministry previously had requested the Finance Ministry to make arrangements for exchange tax exemption for fertilizer, pending an approval by the National Assembly of a new fertilizer price list to be based on costs inclusive of the exchange tax. The present price list is based on the 650-1 official exchange rate.

According to the Finance Minstry, government-distributed fertilizer must be priced on the basis of an 800-1 rate—the sum total of the official exchange value and exchange tax.

PAKISTAN

Fertility survey being made

The Government of Pakistan is spending a sum of Rs 9,22,000 on the rapid soil fertility survey in the country this year in order to raise per acre yield of crops, it was learned in Karachi.

The scheme for rapid soil fertility survey was prepared by an expert of F.A.O. and put into operation during 1958-59.

Under this scheme, quantity and quality of fertilizers required for each type of soil is being assessed so that the yield per acre may be raised.

The Government spent Rs 9,13,000 on this survey last year.

• • •

The greatest percentage target for West Pakistan in the context of the Second Five-Year Plan is that of the production of fertilizers which will increase from the present annual level of 42,000 tons to 3 lakh tons annually by the end of 1964-65.

The target for the production of foodgrains has been fixed at 72 lakh tons as against the present production of 58 lakh tons.

The production of wheat is to rise from 37 lakh tons to 42 lakh tons that of maize from 5 to 6 lakh tons and that of barley from 13 to 15 lakh tons.

The present production of cotton in the province is 17 lakh bales. By the end of the plan period the production will rise up to 23 lakh bales. The production of tobacco of 13 lakh pounds will stand at 149 lakh tons.

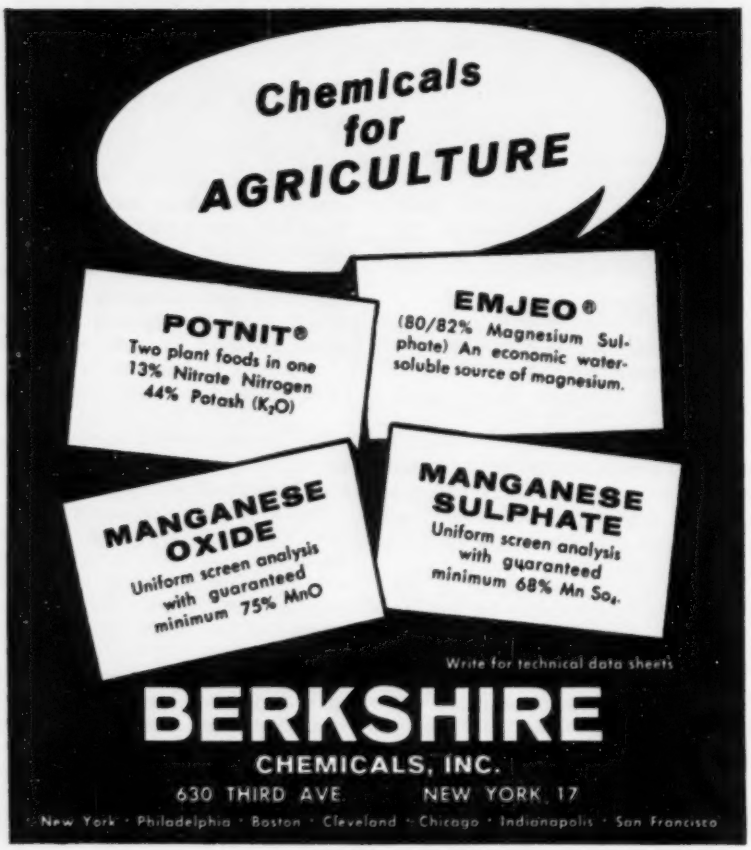
The province produces 13 lakh tons of vegetables and fruits. In 1965 it will be producing 16 lakh tons.

VIETNAM

Provides communists phosphate

Communist North Vietnam is opening for production the great phosphate deposits near Lao Cai on its northwest frontier with Red China.

For anyone concerned with the future food needs of Asia's burgeoning populations, this is an event of major consequence. Particularly, it can become a boon to Communist China, which is importing annually from Europe more than a million tons of chemical fertilizer. And Peiping admits they need at least 20 times this amount every year.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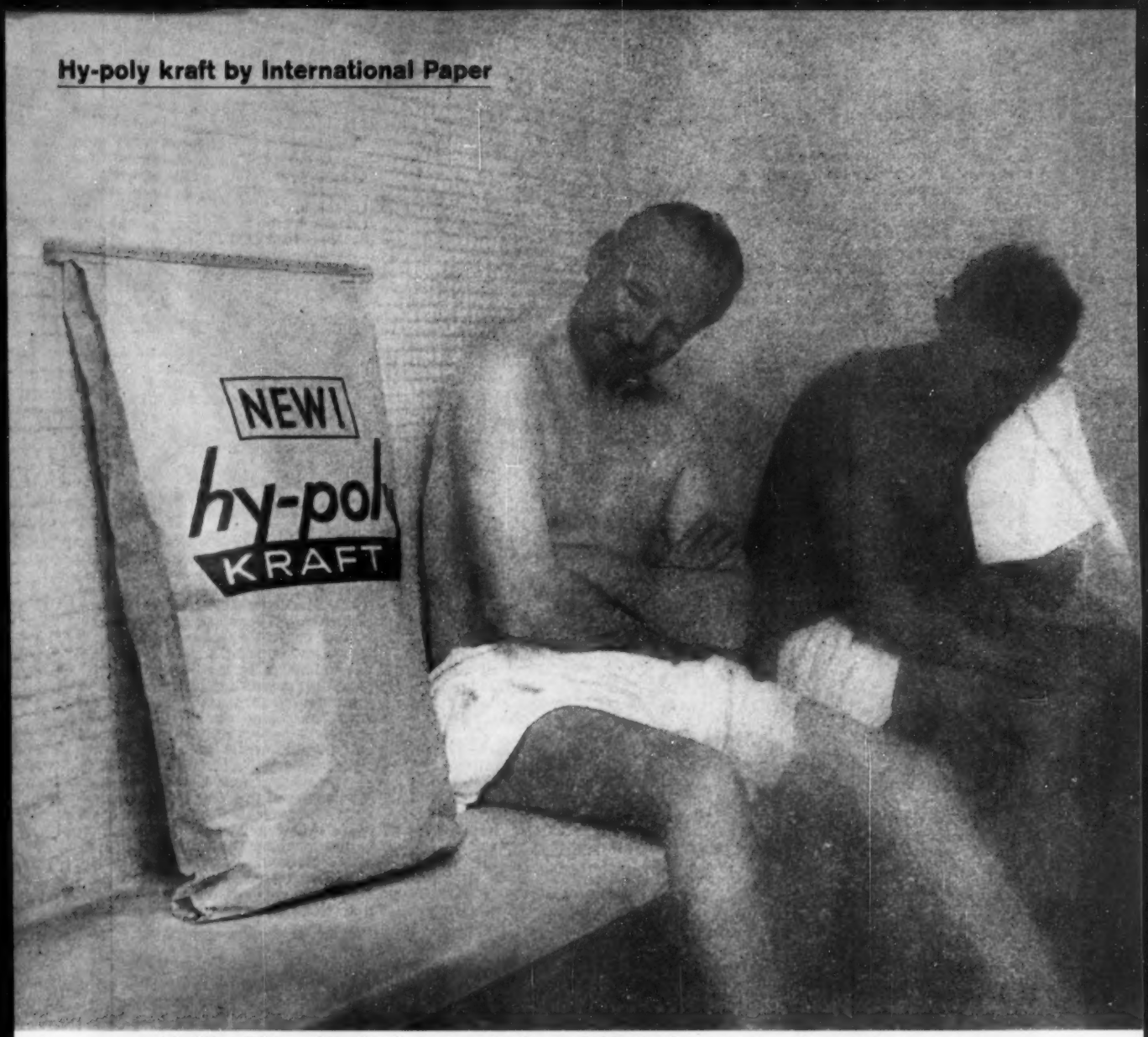

This "Hy-poly" Bagpak® multiwall was given a 360-hour Turkish bath to demonstrate its moisture-resistant properties.

Trial by steam bath!

Read how new humidity-proof Hy-poly kraft makes medium- and low-density polyethylene sheets extravagant by comparison.

THE multiwall bag in our picture is made of Hy-poly kraft. It contains *calcium chloride*.

International Paper steamed this multiwall in 90% relative humidity at 100° F. for 360 hours! (Unprotected, under these conditions, calcium chloride takes on 2½ times its weight in water in about an hour.)

But when the bag was opened, the thirsty crystals spilled out as though they had been stored in the middle of the Sahara!

Bagpak's Hy-poly kraft is not only humidity-proof. It *saves money*, too. Savings range from $2 to $16 per thousand multiwalls.

Hy-poly kraft is so superior to medium- and low-density PE sheets that you get equal, if not greater, moisture-vapor protection from a coating about *half as thick!*

This dramatic new barrier sheet is a product of 62 years of papermaking and packaging experience. It is only part of a *complete* multiwall packaging service offered to you by International Paper.

Whatever your multiwall packaging needs, it will pay you to talk to your Bagpak packaging engineer. He has complete information. It's yours for the asking.

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FREE LITERATURE ON EQUIPMENT MATERIALS AND SUPPLIES

Gyradisc Crusher Booklet

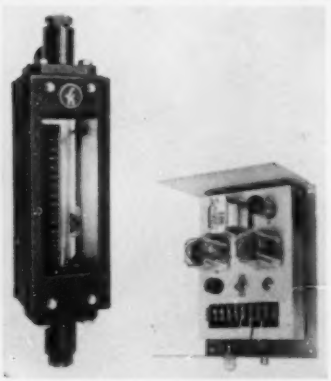
The story of the Gyradisc Crusher for use in the production of large tonnages of extremely fine products is told in a new 4-page, 2-color bulletin recently released by Nordberg Manufacturing Company. Described are the revolutionary method of comminution by the Gyradisc, a process of alternately impacting and releasing a thick mass of material, and the unique feed arrangement to assure thorough mixing.

The engineering features that make the Gyradisc outstanding are listed and a cross section drawing clearly illustrates the operation and function of the various components. Product views and a dimensional drawing also are included.

For a free copy, circle number 1 on CF's Information Service card, page 51.

Electronic Alarm Rotameter

A new line of Alarm Rotameter made by the Instrument Division of Schutte and Koerting Company is specially designed to measure fluid rate of flow and to indicate abnormal high or low flows by electronic detection. The instruments employ



a standard Rotameter, with 5 inch, 10 inch, or 600 mm tube, and a high frequency pick-up sensing coil mounted flush against the metering tube. This coil is adustable over the full range of the scale and is connected by cable to the Electronic Alarm.

SK Electronic Alarm Rotameters are made to activate a warning light or alarm device and will start or stop a pump, motor, or control unit. Two models are available.

The Model E, which requires manual reset, can be used with two sensing coils for high and low alarm settings. In this model, the float is outside the field of the coil during normal flow conditions. When the float enters and interrupts the field of the pickup coil, the sensitive relay drops out and de-energizes the coil in the power relay, thus completing the alarm circuit. The alarm circuit will remain closed until the float returns to its normal operating position and the power relay is reset by depressing the reset button.

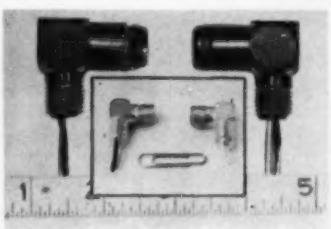
The Model EV, which employs automatic reset, is used with one coil to detect deviations above and below a desired flow condition. In the Model EV, the float is within the field of the coil during normal flow conditions. When the float leaves the field of the coil the sensitive relay is energized and causes the coil in the power relay to de-energize, thus completing the alarm circuit. The alarm circuit will remain closed until the float returns to its normal operating position and automatically resets the power relay.

Series 18200-C Rotameters provides high accuracy for critical applications. They are simple in design and construction and are easy to maintain.

SK Electronic Alarm Rotameters are illustrated and discussed in SK Bulletin 18A, which includes a sectional drawing and complete dimensional, capacity and sizing data. A copy of this bulletin can be obtained by circling number 2 on CF's Information Service card, page 51.

Min'ature Electric Eyes

Especially designed for the automation industries to render long maintenance free service new "miniaturized" electric eyes from Photomation, Inc. are helping to solve many troublesome problems. Small enough to fit into the palm of a hand, the unit may be mounted in restricted areas. Due to miniaturization, they offer a low-cost practical approach to monitoring, counting, positioning, etc. of any object passing or dropping through a light beam. The pick-up units are provided with a ¼" standard pipe thread for easy mounting. These versatile units may be used to operate relays when a direct light beam is interrupted by a passing object or arranged to operate on reflected light from a surface. The Photomation relay amplifier housing contains the power relay and associated electronic equipment together with a sensitivity adjustment and a light adjustment. By a proper adjustment of these controls, the relay may be set to operate at any desired threshold of light.



For precise accurate control for registration, a self-contained unit of the reflecting type has been developed. This can be targeted to operate on very fine line or a sharp edge of color variation.

Several different type photocells are available for use to meet various conditions. Also, many circuits often involving delays in action, pulse monitoring, etc. have been developed.

For descriptive Bulletin 590, circle number 3 on CF's Information Service card, page 51.

Liquid Cyclone Bulletin

The eight-page brochure, Bulletin No. 2503, describing rubber-lined DorrClone® liquid cyclone classifiers, has been revised and reissued by Dorr-Oliver Incorporated. Combining high capacity with low installed cost in a compact, carefully engineered unit, the DorrClone has proven to be an efficient classification unit providing controlled and predictable operation. The Type FR DorrClone, described in this brochure, is completely rubber-lined and manufactured in several easily replaceable parts. It is available in 6, 12 and 24 inch diameters, each furnished with a choice of several sizes for vortex finder and apex valve openings. In addition, the apex valve opening can be further adjusted without disassembly.

A description of Siphontrol® underflow control has been added in the revised brochure. Siphontrol,

which may be supplied as an accessory, maintains a reasonably constant underflow density automatically and without instrumentation over a full range of feed variations.

The Type FR DorrClone is used widely in chemical processing classifying and degritting, and in many other unit operations in a number of industries.

Bulletin 2503 is available free by circling number 4 on CF's Information Service card, page 51.

Thermometer Entry Port

Arthur F. Smith, Inc. has announced a new adjustable thermometer entry port for use with ground glass standard taper laboratory ware suitable for general purpose thermometric application.

The ASCO 10/30 Thermometer Entry Port is manufactured from Teflon and consists of a high vacuum O-ring seal, both inside and outside, permitting use at pressures as low as 10-8 mm Hg., and temperatures as high as 500°F.

It obviates the need for expensive ground joint thermometers, and at the same time permits accurate adjustment of the stem exposure to the thermometer giving accurate results not obtainable with fixed exposures.

The O-ring seals incorporated in the port are suitable for long service without replacement, but may be replaced when and if necessary, and are obtainable separately.

For further information, circle number 5 on CF's Information Service card, page 51.

Research Air Conveying

A unique research laboratory, designed for full-scale testing of modern air conveying systems, has just been completed by Flo-Tronics, Inc., manufacturer and designer of air conveying systems and process controls.

The laboratory will allow Flo-Tronics' engineers and potential customers to test and evaluate materials handling problems with any type of material.

The new facility consists of an actual working system made up of Flo-Tronics' new "Sweep-Flo" fluidizing units, rotary airlocks, a "puffless" bag dump, "Flo-Seal" line diverters, scaling equipment and transistorized electronic process control panels. By combining several lines of ducts, installations up to 450 feet long can be duplicated.

Flow characteristics, material-to-air ratios, horsepower requirements and equipment performances for all kinds of materials can thus be obtained under regular operating conditions.

Companies are invited to make use of this new facility without obligation, or to deliver materials to Flo-Tronics for testing and a certified performance report. For further information, circle number 6 on CF's Information Service card, page 51.

Stainless Steel Propellers

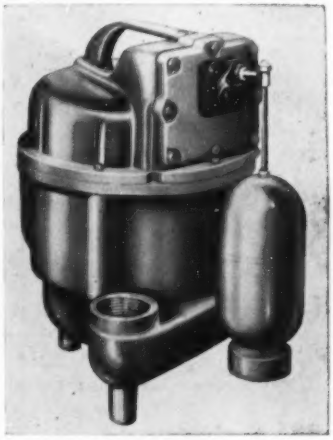
Terriss-Consolidated Industries now offer to processing plants a complete line of stainless steel replacement propellers to fit existing equipment. These are offered in diameters of 3, 4, 5, 6, 7, 8, 10, 12, 14 and 16." Terriss furnishes its propellers bored to customer's specification. Propellers up to 10" diameter

can be drilled to 1" maximum bore . . . those over 10" diameter take from 1" to 1½" maximum.

For further information contained in Terriss Propeller Bulletin, circle number 7 on CF's Information Service card, page 51.

Portable Pump

A fully submersible sump pump, ENPO Model AU, is available for both stationary and portable applications. The Model AU, produced by the Piqua Machine and Manufacturing Company is designed to take 'on the job' jolts and to operate efficiently under constant start and stop conditions. To increase its portability the unit is available with a light weight aluminum housing and built-in carrying handle. The ENPO waterproof, quick change switch that replaces by 'plugging in' is standard equipment on the Model AU. The pump is driven by a ½ HP. motor and has a free delivery of 3000 G. P. H.



For descriptive catalog 259, circle number 8 on CF's Information Service card, page 51.

'Live Bin' Discharge

A new 'Live Bin' has been announced by Vibra Screw Feeders, Inc. Basically a storage bin suspended on live rubber mounts and equipped with a vibrating external activator, the unit permits maximum

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hopper capacity wtih a bin bottom that may be made nearly flat.

Applicable to any hopper size, and offering high amplitude of movement at the bottom, the Vibra Screw 'Live Bin' is especially applicable to the clean discharge of materials with poor flowing qualities. Sealed-in unit requires no maintenance, and is quiet in operation.

For detailed information, circle number 9 on CF's Information Service card, page 51.

Instrument Valves

A new line of Tufline instrument plug valves featuring Teflon sleeves has been introduced by Continental Manufacturing Company.

Rated for 300# ASA service, the valves, which have screwed ends,

are available in sizes ¼" through 1." They are especially recommended for on-off use on rated pressures within temperatures from -50°F to +400°F, with gas or liquid, corrosive or non-corrosive media.

Chief feature of the new Tufline instrument valves is simplified design bringing a construction previously available only in more expensive valves—at a price that the valves can be economically used within the 150# service range as well as the 300#.

The advantage of body bore construction is that it provides a marked increase in the resilience of the specially processed pure Teflon sleeve. Thus, leak-proof shut-off is assured even under conditions of fluctuating temperature. Of equal importance in the design of these new Tufline instrument valves is the use of an inverted tapered plug and bottom diaphragm cover seal, so designed that line pressure actually reinforces the plug seal.

Because all moving parts in the valves are supported by low-friction Teflon, to lubrication is required. Consequently, possibility of product contamination, seizing or galling is eliminated.

The new valves are available in standard 303 and 316 S. S. They may also be ordered in other metals, with special ends, or modified for panel mounting.

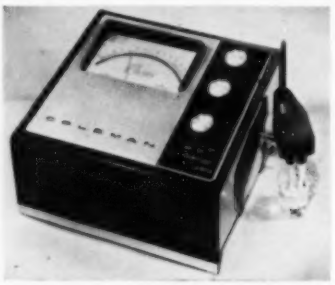
Specification sheets and additional information on the new line of Tufline instrument plug valves may be obtained by circling number 10 on CF's Information Service card, page 51.

New pH Meter Simplified Controls

A new pH meter, the Model 31 Companion, has just been introduced by Coleman Instruments, Inc. It provides maximum simplicity of operation with routine precision within 0.05 pH, according to the manufacturer.

The instrument has an unusually wide (6¼ inches) scale covering the full 0-14 pH range; it permits easy, direct reading to 0.02 pH. The scale is mirror-backed to eliminate reading errors due to parallax. Three controls cover all instrument operations—only one is required for routine measurements.

The instrument is line-operated (95-125 volts, 50/60 cycles) with full stabilization against effects of varying supply voltage. It uses Coleman screw base glass and reference electrodes which require only 3.5 ml sample and can be used in contain-

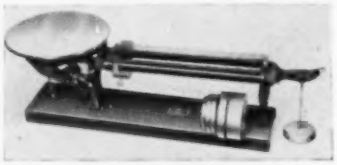


ers as small as a 10 ml beaker . . . this provision eliminates the necessity of buying 'small sample assemblies.' An accessory permits utilization of electrodes of other manufacture.

For price and further information, circle number 11 on CF's Information Service card, page 51.

Solution Balances

For use wherever liquids or solids must be weighed with great accuracy, a new line of heavy-duty lab-



oratory balances (see cut) has been introduced by Henry Troemner, Inc. Sensitivity is 1 gram.

Available in capacities of 20 kilograms (45 lb.) and 30 kilograms (70 lb), the new balances are called Series 80 Solution Balances. Two stainless steel weigh beams are graduated in grams and ounces (eight variant models), and a complete set of weights is included on an integral weight rack. Tare capacity is 2 kilograms.

Smooth, easy-to-clean, corrosion-resistant surfaces and ready portability are added features of the new Series 80 balances. Bulk-weighing scoop is an optional accessory. All models measure 34" long, 11" wide, 10" high.

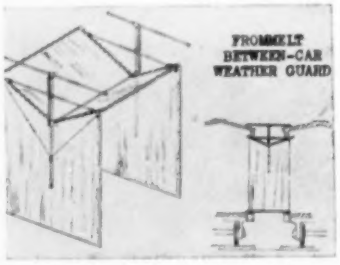
For complete specifications and prices, circle number 12 on CF's Information Service card, page 51.

Protection Between Cars

Frommelt Industries is introducing a new and unique type of car-to-car weather protector, the 'Between-Car-Weather Guard.'

A rigid, lightweight aluminum frame and Fro-Prene Nylon cover are combined with a design to enable the Weather Guard to fit between wood or steel box cars . . . regardless of height or width of doors, or distance between cars.

The new Frommelt unit is easily set in position, and becomes instantly self-locking and self-supporting with tension springs and framing arrangement as illustrated in the drawing. The novel inverted V top frame provides maximum overhead protection and, at the same time, controls dripping from car roofs. Water drainage will be to either side, well away from car doors.



The Weather Guard can be set in position from the floor of the car and securely locked in minutes without tools, clamps, or gadgets. Protective side curtains may be easily adjusted to meet the varying heights of the car doors. They fasten securely inside the cars for a draft-free, weather-tight closure.

Complete details, prices, and literature are available by circling number 13 on CF's Information Service card, page 51.

No Postage Stamp Necessary If Mailed in the United States

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Commercial Fertilizer and Plant Food Industry

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. . . and drop it in the mail

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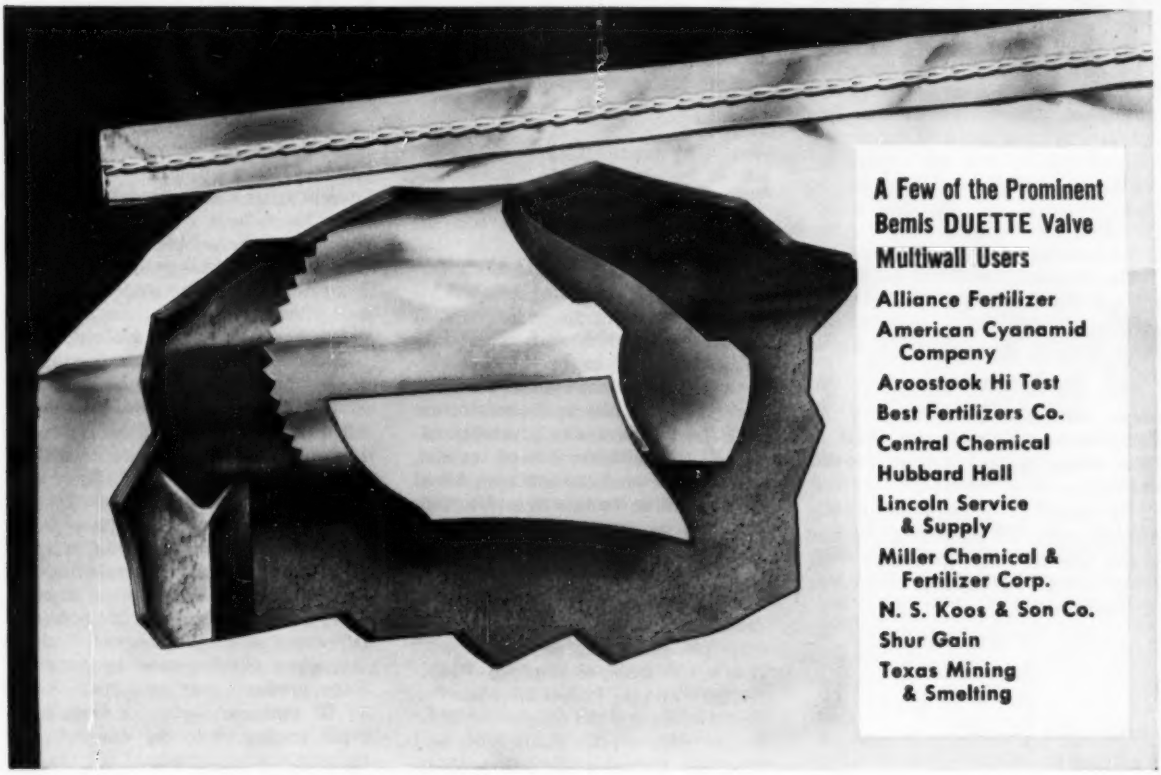
Bemis Duette® Sewn Multiwall Sleeve Valves Have Been Experience-Proved

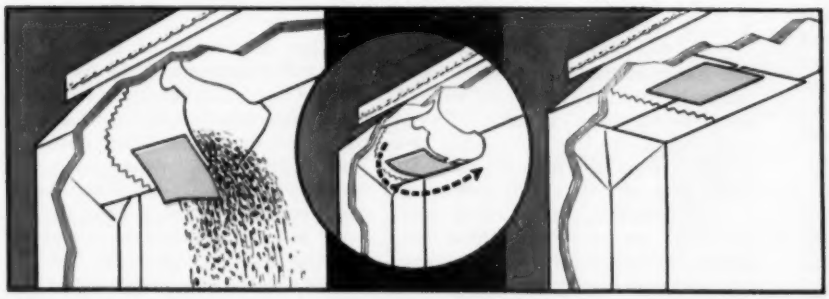


A Few of the Prominent Bemis DUETTE Valve Multiwall Users

- Alliance Fertilizer
- American Cyanamid Company
- Aroostook Hi Test
- Best Fertilizers Co.
- Central Chemical
- Hubbard Hall
- Lincoln Service & Supply
- Miller Chemical & Fertilizer Corp.
- N. S. Koos & Son Co.
- Shur Gain
- Texas Mining & Smelting

It's been more than three years since Bemis perfected the DUETTE, the multiwall bag valve-on-a-valve that gives double sift protection for granular, pelletized or pulverized products.

In that time, DUETTE Multiwalls have been used by many of the leading chemical and fertilizer manufacturers, with consistently gratifying results. The diagrammatic pictures show why . . .



WON'T CLOG . . . The Magic Yellow check flap falls freely aside from the valve slit. The sleeve won't choke or clog the packing spout.

POSITIVE CLOSING ACTION . . . This diagrammatic picture shows the action as the Magic Yellow flap starts to close over the valve slit.

CAN'T SIFT . . . When the bag is filled, the flap, acting as a check valve, completely overlaps and covers the valve slit, to stop sifting.

General Offices
408-C Pine Street
St. Louis 2
Sales Offices In Principal Cities

This is the third in a series of articles covering various aspects of the fertilizer dealer-farmer survey made by the authors

the role of the fertilizer dealer in

The Effectiveness of Service

by George M. Beal, Joe M. Bohlen *and* Larry Campbell

The fertilizer industry's periods of intense price cutting have, either directly or indirectly, undoubtedly been one of the industry's major problems.

This use of price cutting as the major method of competing for the fertilizer market tends to result in three major problems from the industry's point of view:

1. It leads to dealers pressuring manufacturers for increasingly lower prices, and for more assistance with credit and almost innumerable types of discounting.

2. Dealers develop unfavorable attitudes toward the fertilizer business because of low profits. This leads to the dealer's failure to aggressively merchandise fertilizer.

3. Research evidence indicates that farmers are in general only using about a third as much fertilizer as they should for best returns on their investment. This low level of use results largely from farmers' lack of information about fertilizer. Yet, if the dealer cannot obtain a reasonable return on his fertilizer department he cannot afford to devote time or money to development of this vast potential market.

Some evidence of the critical role of farmers' lack of knowledge about fertilizer is provided by a 1958 study of 315 randomly selected Iowa farmers conducted jointly by the Iowa Agricultural Experiment Station and the Tennessee Valley Authority.

When the farmers were asked what factors limited their use of fertilizer, some of the most frequent answers were: risk and uncertainty involved in use; low return per dollar investment; not enough information about fertilizer; dissatisfaction with past experience; presently using all the fertilizer I need to; and, unfavorable landlord attitude. All of these limiting factors are of a type that can be changed by a properly planned and executed dealer educational-promotional program.

And, while farmers may tend to think of fertilizer at the lowest possible price as being the best "buy," it is not difficult to think of a relatively average situation where a dealer could sell the farmer fertilizer on the basis of price discounting and save the farmer from $.75 to $1.50 per acre. However, the dealer can provide the farmer with information about fertilizer through educational-promotional programs, through soil sampling-testing, and with advice at the time of purchase which might well help the farmer make from $5-10 (or more) per acre through more intelligent use of his fertilizer. And, the farmer, the dealer and the feritlizer industry will probably all be in a better position.

When the dealers' reasons for not merchandising fertilizer more aggessively through the use of educational-promotional programs are analyzed, a number of specific attitudes are evidenced, such as: low profit, lack of time, credit problems, lack of facilities, price cutting, etc. However, on analyzing these responses more intensively it appears that the dealers may be saying that the returns from their fertilizer department are so low that they are better off investing most of their resources in other departments of their business. The validity of this reasoning is not known, and cannot be known without additional research. However, the validity of this attitude is not what governs the dealers' behavior; rather, it is their perception of their relative returns from their fertilizer department as being low.

Some examples of dealers' attitudies about their fertilizer businesses are provided by the 1958 study of 118 randomly selected Iowa fertilizer dealers.

1. The dealers' average fertilizer mark-up was 9.3 percent. By comparison their average mark-up for other commodities they retailed was 14.9 percent. Some examples of specific averages: feed, 13 percent; seed, 12 percent; building supplies, 21 percent; and, implements, 24 percent. However, it should be noted that marketing costs related to some of these products may be higher.

2. 60 percent of the dealers said price cutting was the competitive technique used by others that made their fertilizer sales most difficult.

3. Only 26 percent of the dealers said fertilizer was a good money maker in their businesses.

4. 34 percent said pricing problems were the fertilizer industry's biggest problem.

5. 79 percent of the dealers said their feritlizer profit margins were inadequate. And, their answers to this question were highly related to their actual fertilizer mark-up.

These are some of the reasons why price competition results in fertilizer dealers dropping their fertilizer departments and investing this time and money in order, probably more profitable, departments of their businesses. Or, while the dealer may continue to carry fertilizer, he may not devote time or money to merchandising it properly. For example, in the 118 dealer study, 26 percent considered fertilizer "just another service to customers," and another 15 percent considered it "not a money maker." Thus, 41 percent of the dealers assigned fertilizer

Data in this paper are from Iowa State University Experiment Station Project No. 1352 done in cooperation with the Agricultural Economics Branch, Division of Agricultural Relations, Tennessee Valley Authority. The project is under the co- leadership of George M. Beal and Joe M. Bohlen, professors of rural sociology, Department of Economics and Sociology, Iowa State University. Data are taken from three phases of Project No. 1352. These phases were under the supervision of assistant professor John Harp, and graduate assistants Larry Campbell and Quentin Jenkins. They were assisted by graduate assistant research tea members Larry Kasperbauer, Daryl Hobbs and Richard Warren.

an extremely minor role in their businesses.

Indirectly, price competition appears to have led to dealers' failure to adequately and properly promote fertilizer sales, resulting in a relatively underdeveloped market for fertilizer. The rationale for this statement is that lack of knowledge about fertilizer appears to be one of the major factors limiting farmers' use of it. For example, an extremely strong relationship exists between farmers' knowledge about fertilizer and the level of their fertilizer use, and, many of the factors named by farmers as limiting their fertilizer use such as low returns on their investment are really a result of lack of knowledge about fertilizer. And, fertilizer dealers appear to be a major source of farmer information about fertilizer. Thus, if the dealers perceive the profit margin to be inadequate, they will probably not "bother" to keep up with new fertilizer developments or to recognize that they should provide farmers with information about fertilizer as part of their fertilizer related services. This indication of the dealer's lack of knowledge about fertilizer is that the average dealers correctly answered only 4.6 of 10 relatively fundamental questions about fertilizer and its use. And, the profit margin must provide some incentive to the dealers since fertilizer only averaged 14.3 percent of the 118 dealers' gross income.

The dealer's performance of the role of a reliable information source about fertilizer and fertilizer use appears to be a service for which farmers are willing to pay. The farmers pay for this service either or both in terms of higher prices for fertilizer, or by buying fertilizer from dealers who offer this service in preference to dealers who do not. For example, in the previously mentioned Iowa state-wide study, it was found that the dealers who thought they should be a farmer fertilizer consultant had this advantage over the dealers who only considered themselves a "friend of the farmer" in their fertilizer sales role:

1. the "fertilizer consultant" had an average fertilizer sales volume of $48,000 as compared to an average of $30,000 for the "friend of the farmer."
2. his average fertilizer gross profit was $4,100 as compared to the "friend of the farmer's" $2,800.
3. his average fertilizer mark-up was 10.7 percent as compared with the "friend of the farmer's" average of 6.9 percent.

The same sorts of relationships also existed between those dealers with high levels of fertilizer knowledge as compared with those dealers having low levels of fertilizer knowledge. Dealers with the highest scores on the fertilizer test had average fertilizer sales volumes of $226,400 as compared with the $31,740 average of those with the lowest scores

However, in addition to these services of a relatively intangible nature, some dealers also offered many physical services, some of which, like soil testing, also provided the farmer with information. Again the problem is whether or not these services are effective in competing with dealers who use prices as their major competitive technique. Providing some evidence about the effectiveness of services as opposed to price in fertilizer sales competition were data gathered from a 1957 study of 120 Iowa farmers. These farmers were asked to complete a sentence beginning, "I buy my fertilizer where I do because . . . . ". Their responses are shown in Table 1.

Price was named by 17 percent of the farmers while personal characteristics of the dealers were named by a total of 29% (24% + 5%) of the farmers. While services as such were named by only 9% of the farmers, personal characteristics of the dealers undoubtedly include information as a service. Convenience, mentioned by 22% of the farmers, appears to mean both a short distance and that the farmer already buys other commodities from the dealer so that it is convenient to purchase fertilizer there also.

In this same study the farmers were asked what services their dealers offered, and also to name those fertilizer-related services of importance to themselves.

With one exception, credit, the farmers checked as important more services than were being offered by their dealers. The soil sampling-testing group of services was all being offered by a smaller number of dealers than the proportion of farmers who considered it important. These same large discrepancies also existed for fertilizer clinics and demonstration plots. Thus, the area of greatest discrepancy between dealers' offerings and the farmer's demands for services is the one of educational type services. This information is presented in Table 2. Also shown in this table is the average fertilizer sales of dealers in the 118 dealer study who were offering each of the specific services.

Of even more direct interest to the retail dealer is the effectiveness of specific services as measured by their effect on fertilizer sales volume, mark-up and profit. This information is provided by the 118 dealer study. Table 3 shows the percentage of the 118 dealers offering each of the specific services, and the average fertilizer sales volume, fertilizer gross profit, mark-up and total business volume of the dealers offering each of these services.

The 120 farmer data indicated that the biggest disparity between importance of a service to farmers and the proportion of dealers offering this service was for the educational-type services. This would seem to indicate that these educational type services would have the highest returns for the dealers offering them.

Table 1

I buy my fertilizer where I do because:

	Percent
He is a likeable dependable dealer—honest	24
He is convenient	22
Of the good services offered	9
Of the lower prices and/or refunds (patronage)	17
Of personal reasons, including regular place of business	5
No answer or "other responses"	23

Table 2—Services Named as Important by Farmers vs. Services Offered by Their Dealers

	Percent of Farmers Naming as Important	Percent of Farmers' Dealers Offering	Difference	Fertilizer Sales
Fertilizer demonstration plot	30	6	—24	$61,120
Takes soil samples for farmers	34	17	—17	$91,158
Soil tests (own lab)	28	12	—16	$61,152
Shows farmers how to sample soil	32	16	—16	(no data)
On-farm checks of fert. use results	31	18	—13	(no data)
Fertilizer clinic	21	9	—12	$78,278
Mails in soil samples for farmers	34	23	—11	$70,674
Plans long-range fert. program for farmers	34	24	—10	$57,745
Liquid spreader	20	12	— 8	$75,614
Adequate supply of needed analysis on hand	50	43	— 7	(no data)
Interprets soil test results	32	26	— 6	$60,053
Calls on farmer re. fert. use advice	28	23	— 5	(no data)
Anhydrous applicator	17	13	— 4	$22,519
Small dry fertilizer spreader	37	34	— 3	$57,142
Credit	38	43	+ 5	$50,269
Average all dealers				**$40,155**

And these educational services do seem to be associated with relatively high dealer fertilizer sales, mark-up and gross profits.

The discounting practices are not only related to the lowest fertilizer mark-ups, as might be expected, but are also associated with the lowest fertilizer gross profits. This seems to indicate that price discounting does not result in enough additional volume to make up for the low margin. In this specific study, the highest mark-ups tend to be associated with the offering of spreading liquid and anhydrous and soil sampling-testing activities. Spreading of liquid fertilizer and taking soil samples for farmers are the two services most consistently related to high fertilizer sales, gross profit and mark-up. This information should be interpreted with some caution, however, since the average figures associated with the offering of each of these services will be to some extent affected by other services offered by the dealer.

The dealers were also asked about the amount of fertilizer sales competition in their trade areas. Then they were asked how many competing firms sold fertilizer in their trade areas. No meaningful relationship was found between the number of other businesses selling fertilizer in the dealer's trade area and the dealer's perception of the fertilizer sales competition intensity. This seems to indicate that the dealers' evaluations of their fertilizer sales competition was more a result of the extent to which they were effectively competing for the fertilizer market than the-number of dealers with whom they were competing.

The dealers who saw the fertilizer sales competition as being relatively **weak**, as compared with those who said the competition was **strong**, tended to offer more:

1. services of an educational nature such as fertilizer clinics and test plots.
2. spreading services
3. credit
4. soil testing and related services.

The dealers who saw the competition as being relatively **strong** in their trade areas tended to use more of these fertilizer merchandising techniques:

1. price discounting such as volume and seasonal discounts.
2. mass promotional activities such as mass media advertising and fair displays.

The three groups of dealers who thought the level of sales competition was the lowest were using fertilizer merchandising techniques offered by relatively few dealers and considered important by a large proportion of farmers such as fertilizer clinics and demonstrations and soil testing-sampling. The use of these sorts of services should reasonably be related to perceiving the fertilizer sales competition as weak

In general there seems to be a tendency for dealers using: (1) educational; (2) spreading; and, (3) soil sampling-testing services, to consider the fertilizer sales competition to be less intense than do dealers who do not utilize these fertilizer merchandising techniques. In addition, dealers who felt that the fertilizer sales competition was less intense tended to maintain higher average fertilizer mark-ups than did the dealers who saw the competition as intense. From these findings it appears that one of two conclusions may be drawn:

1. That dealers who utilize the more effective fertilizer promotional techniques are able to maintain a higher fertilizer mark-up and still not suffer from competition.
2. That in areas where the fertilizer sales competition is intense, dealers are forced to reduce their fertilizer mark-ups in order to compete and thus are unable to afford additional customer services.

However, field observation tends to indicate that the first conclusion is more reasonable. In a number of instances dealers competing for fertilizer sales in the same trade area were in severe disagreement concerning the intensity of the fertilizer sales competition. In general, the dealer offering more of the services expected by farmers were the ones who thought the fertilizer sales competition less severe than their counterpart competing for the same fertilizer dollar.

If the manufacturer should remember that fertilizer, on the average, made up only 14.8 percent of the 118 dealers' total business volume, and that their fertilizer mark-up was less than their average mark-ups in other departments of their businesses.

Perhaps the best measure of the extent to which a fertilizer dealer is prone to try new fertilizer merchandising techniques is not the type or size of business he operates but rather the kinds of attitudes the dealer has about adopting new ideas.

A "dealer progressivism" attitude scale was used in the 118 dealer study to measure the extent to study to measure the extent to which sales and merchandising techniques. The dealers who scored high on this scale—those who had favorable attitudes toward trying new merchandising techniques — tended to have these characteristics:

1. There was no relationship between this progressive orientation and the dealer's total business volume. This suggests that progressivism is independent of the dealer's total business size, and that promotions may be carried out with dealers operating all size businesses.
2. They offered more services of an educational nature such as fertilizer clinics, and soil sampling and related services.
3. They offered more fertilizer spreading services.
4. They offered less price discount- and credit than did those who were less progressively oriented toward new merchandising techniques.
5. They had higher fertilizer gross profits—an average of $7,560 as compared with the all-dealer average of $4,000.
6. They had higher fertilizer gross profit margins—an average of 9.5 percent as compared with the all-dealer average of 9.3 percent.
7. Fertilizer tended to comprise a larger part of their total business.
8. They tended to have higher

Table 3.—Average Figures Associated with Use of Various Fertilizer Merchandising Techniques

	Percent Dealers Offering	Average Fertilizer Sales Volume	Average Fertilizer Gross Profit	Average Fertilizer Mark-Up (%)	Average Total Business Volume
All-Dealer Averages		**$40,153**	**$4,004**	**9.3**	**$460,700**
Credit	79	$50,269	$4,090	9.2	$454,242
Help farmers plan fert. programs	75	$57,745	$3,117	9.6	$567,806
Self-haul discount	69	$52,931	$4,730	9.4	$548,125
Seasonal discount	68	$62,047	$4,470	8.8	$567,725
Mass media ads	59	$60,790	$4,977	9.6	$591,475
Volume discounts	55	$70,226	$2,420	8.8	$608,910
Calling on farmers	53	$68,025	$5,015	10.0	$507,681
Interpreting soil test results	51	$60,053	$4,985	9.7	$478,101
Bulk application	50	$70,264	$5,789	9.4	$540,024
Send in soil samples for farmers	49	$70,674	$5,224	10.4	$596,213
Throw-aways and mailings	36	$74,787	$6,473	9.5	$595,034
Small dry fertilizer spreader	36	$57,142	$4,443	9.4	$610,462
Take soil samples for farmers	35	$91,158	$5,987	10.7	$445,696
Fair displays and booths	25	$90,013	$8,930	9.8	$662,817
Spread liquid fertilizer	18	$75,614	$7,869	10.3	$544,275
Fertilizer clinic	17	$78,278	$6,515	9.1	$607,681
Fertilizer demonstration plot	13	$61,120	$5,940	9.5	$469,195
Anhydrous application	12	$22,519	$4,724	11.6	$272,091
Soil testing (own lab)	10	$61,152	$5,239	10.1	$627,406

levels of knowledge about fertilizer.

9. They felt that their customers expected them to be consultants on fertilizer, rather than only "friends of the farmer."

10. They felt that they should try to influence the farmer's decisions about what analysis of fertilizer to apply, how much to apply and how to apply it.

In summary, while many dealers have negative opinions of the fertilizer business, the data point out that there are some dealers who think the fertilizer business is excellent or has a great potential, believe the profit margins are adequate and are maintaining above-average mark-ups and sales volumes. The greatest discrepancies between the number of dealers offering certain types of services and the number of farmers desiring these services appear to be in the area of information-type, soil sampling-testing, and spreading services. Farmers appear willing to pay for these services since dealers offering these types of services are able to maintain above-average marks-ups and still move considerably above average amounts of fertilizer. This group of dealers has obviously met and overcome many of the problems bothering other dealers.

CHANGES

Royster-Price

F. S. Royster has announced purchase of Price Chemical Company, Louisville, Kentucky—bringing the number of Royster plants to 24. It will be operated as a division, with T. C. Dula as salesmanager and M. G. Rodgers as superintendent. Extensive improvements are planned.

Farmers Fertilizer-Nichols

The Nichols plant, near Oklahoma City has been purchased by Farmers Fertilizer Co., headed by Harold J. Trammell and George Summers and has been reactivated. Mr. Trammell operates plants elsewhere, and Mr. Summers has been with American Cyanamid.

Allied-American

Without giving any reason for the discontinuation, Allied Chemical and American Potash & Chemical have announced that their merger has been discussed and dropped.

Montecatini-Vetrocoke

Montecatini shareholders have voted to merge into their company the Italian manufacturer of nitrogen, glass and coke products, Vetrocoke Co.

Monsanto

Monsanto Chemical Company has created an agricultural chemicals division. Tom K. Smith, Jr. of St. Louis, has been elected a vice president of Monsanto and appointed general manager of the new operating division. His managerial staff, all of St. Louis, includes J. Paul Ekberg, director of marketing; Dr. Richard S. Gordon, director of research; Stanley B. Johnson, director of engineering; Robert R. Rumer, director of manufacturing; James H. Senger, director of development; and Fred T. Mitchell, director of administrative services.

Headquarters and research laboratories for the new division will be located at St. Louis. Its production facilities will include plants at El Dorado, Ark., and Luling, La., with additional manufacturing units at the company's Anniston, Ala., Nitro, W. Va., and Monsanto, Ill., locations.

National Distillers-Federal Chemical

A merger of Federal Chemical Company, Inc., a 76-year-old, six plant manufacturer of mixed fertilizers, with National Distillers and Chemical Corporation has been approved in principle by the boards of both companies according to an announcement by John E. Bierwirth, chairman, and Roy F. Coppedge, Jr., president, of National Distillers and Jefferson D. Stewart, Jr., president of Federal Chemical.

After completion of the merger, Federal will be operated under its present name by its present management, officers and staff as a division of National Distillers and Chemical Corporation. Headquarters will continue at Louisville, Kentucky.

Federal's plants are located in Louisville; Humboldt and Nashville, Tenn.; Danville, Ill.; Butler, Indiana; and Columbus, Ohio.

IMC to Market for ERCO

Dr. David E. Jones, president, Electric Reduction Company of Canada, Ltd., Toronto, Canada, and Thomas M. Ware, president, International Minerals & Chemical Corporation, Skokie, Illinois, announce that the two companies have entered into an agreement providing for the sale of ERCO's phosphatic fertilizers in the United States, through I.M.C.'s Agricultural Chemicals Division.

ERCO is presently building a large phosphatic fertilizer plant at Port Maitland, Ontario, with production scheduled for early 1961. I.M.C. will market throughout the United States the triple superphosphate and phosphatic fertilizer solution produced at this plant.

ERCO now produces single superphosphate at Port Maitland for fertilizer use, and a wide variety of industrial phosphates at Buckingham, P. Q.

Raymond Division Moves

After having been located for nearly half a century in the Chicago Goose Island Industrial District, the Raymond Division of Combustion Engineering, Inc., have moved their offices to the John Plain Building at 427 West Randolph Street, Chicago 6, Illinois.

The new Telephone Number is CEntral 6-4044.

Armour

Armour Agricultural Chemical Company has announced the appointment of O. Denton Hudson as transportation manager; Thomas L. Carey, director of exploration and mining development; and David W. Brochstein, production manager — fertilizer division.

The appointments, all three in the company's general offices in Atlanta, were announced by W. E. Shelburne, president of the fertilizer-manufacturing firm.

Mr. Hudson, Armour's Southeast area manager, transportation and distribution since 1956, replaces George W. Leyhe, who retired August 27, 1960, after 38 years of service. Mr. Leyhe had been transportation manager of the company since 1933.

Mr. Carey, mining consultant for Armour and Company in Chicago for a year, was previously employed by the Potash Company of America, Ltd., in Saskatoon, Saskatchewan, Canada and in Carlsbad, New Mex., for 13 years.

Formerly plant manager of Armour Agricultural Chemical Company in the Houston division, Mr. Brochstein joined the company in 1948. He served as a chemical control man, technical assistant and assistant plant manager in Houston, before being named plant manager in 1958.

Ralph C. Herring has been promoted to credit manager of the Wilmington division. Mr. Herring has been a salesman in Armour's Wilmington N. C. division since 1954, residing in Lumberton, N. C. He joined the company on July 3, 1950.

CALIFORNIA

American Potash & Chemical Corporation's prduction of potash will be increased over 25 per cent when previously announced expansions at the firm's Trona, Calif., plant are completed in mid-1961, it was announced by Wm. J. F. Francis, vice president, marketing.

New granulation facilities are being installed in conjunction with the increased primary potash production which will boost output of new improved granular muriate of potash for agricultural purposes.

The $11,000,000 program, which will affect all of the plant's primary products, includes construction of a large fourth evaporator unit and other process changes.

• • •

Globe Guano Co., San Francisco, national distributors, have announced the availability of Vitaguano bat guano in 1, 5, and 25-lb. bags; Nitro "10" in pints, quarts and plastic squirt-type containers. Quick deliveries are now promised.

FLORIDA

U. S. Phosphoric has awarded the contract for its new multi-million dollar ammonia plant at Tampa to Chemical Construction Corp. The plant, which is scheduled for late 1961 completion is due to have a capacity of 350 daily tons.

• • •

American Cyanamid has awarded to Leonard Construction Company the contract for engineering and construction of their new contact sulphuric acid plant at Brewster. The plant will use elemental sulphur as raw material. Construction, to begin immediately, is scheduled for mid-1961 completion. This is in addition to the phosphoric acid project reported here last month.

• • •

Ridge Fertilizer Co., Lake Wales, had minor damage from the recent fire. Spontaneous combustion was blamed.

IDAHO

Bunker Hill's electrolytic zinc plant, between Kellogg and Smelterville, completed last June is delayed in start-up by the current mine-mill strike.

It has a starting capacity of 130 daily tons.

Bunker Hill will operate an anhydrous liquid phosphate plant to be built by Collier Carbon and Chemical, the product to be produced exclusively for Collier.

ILLINOIS

Olin Mathieson Chemical will build at Joliet a $1,500,000 phosphoric acid plant. Edward Block, senior vice-president and general manager of the corporation's chemical division said capacity would be 50,000 annual tons of 75% concentrate.

Construction contracts have already been let, Mr. Block said, and preliminary work is under way. The plant, at the Blockson operation of Olin Mathieson, should be completed by the end of April, 1961. Blockson was a pioneer in the wet process for the production of phosphoric acid or the manufacture of sodium phosphates.

Production probably will go to fertilizer manufacturers in the Midwest, especially in the states of Michigan, Indiana, Illinois, Wisconsin, Minnesota, Iowa and Ohio.

Olin Mathieson owns and operates a high analysis fertilizer plant at Pasadena, Tex.—the largest of its type in the world. However, this plant will not be a customer for the acid production of the Joliet plant, Mr. Block said.

KENTUCKY

DuPont has awarded to Leonard Construction the engineering contract for a Monsanto contact sulphuric acid plant at Wurtland. The raw materials will be chiefly elemental sulphur and Monsanto vanadium sulphuric acid catalyst.

MISSOURI

McQuerter Chemical Co. has opened its plant at Springfield, an investment of $200,000, capable of 25,000 annual tons. It is owned and operated by Loryn McQuerter, formerly manager of the MFA plant foods division.

NORTH CAROLINA

Maxton Oil & Fertilizer warehouses at Maxton were destroyed by a recent fire, with a loss of $100,000 partially insured.

TENNESSEE

Armour and **Virginia-Carolina** are both prospecting for phosphate rock in an area not too far from the big deposits now being worked there. The ore body runs across into Alabama, and is a low-grade, marginal rock.

UTAH

Stauffer Chemical has announced plans to build by the end of 1962 a fertilizer plant at Vernal to utilize the large deposits of phosphate ores in the area—estimated as seven million tons of low-grade ore.

The plant is to be larger than the Salt Lake plant of Stauffer affiliate, Western Phosphates—which is processing 150,000 annual tons. By 1962 the Flaming Gorge Dam is due to be completed, and ready to provide power for the plant.

WASHINGTON

Inland Empire Industrial Research Inc., Spokane has developed a way to pelletize dried peat. As this expands greatly when wet it can be used as a soil conditioner and as a good base for water retention, they report. They believe this will be the foundation for a new industry in the area, which has in the past imported more than 30,000 annual tons of peat—though the State of Washington is estimated to have 50,000 acres of peat land, of which much is near Spokane.

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Sage Chemical and Equipment Co. has filed for incorporation for $50,000 in the Department of State, to deal in fertilizers, agricultural and industrial chemicals.

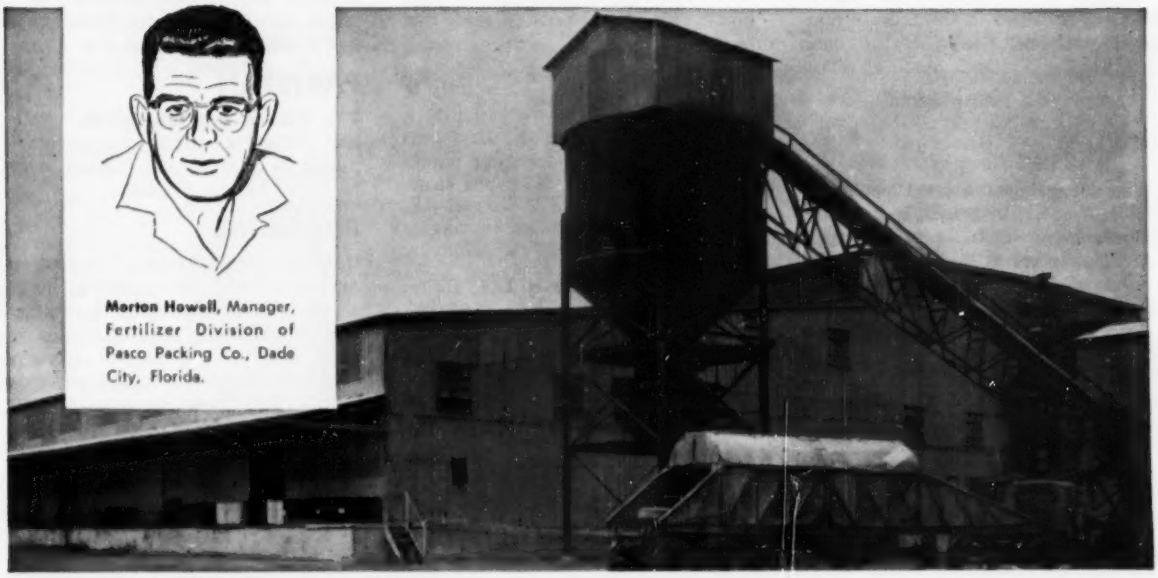
WISCONSIN

The Waushara Farmco cooperative plant at Wautoma, was recently destroyed by fire with a loss of $30,000, estimated by manager Herbert Zellmer. The plant was converted this Summer from a former pickle plant.

AFRICA

Uganda Development Corporation have decided to make 400,000 pounds available for investment in a pilot

Morton Howell, Manager, Fertilizer Division of Pasco Packing Co., Dade City, Florida.



Manufacturing flexibility is the outstanding feature of this advanced mixing plant built by the Fertilizer Division of Pasco Packing Company. With the assistance of Spencer Tech Service, many original innovations were incorporated in the design. Read (below) about the valuable technical help you can get from Spencer:

Pasco Packing Co. Designs Specialized Plant With Help Of Spencer Tech Service

Solving problems for fertilizer manufacturers is the job of the experienced Spencer Tech Service team. When Pasco Packing Company designed its new plant for granulating citrus blends, Spencer Tech experts were on hand to assist. Together, they developed ingenious innovations for processing a wide variety of raw materials into grades which can include all minor elements and up to half nitrate nitrogen.

Because they are specialists in plant engineering and keep up to date on the latest manufacturing processes, Spencer Tech Service men can often suggest efficiencies for improving production and lowering costs.

Mixers also profit from the continuing research being done at Spencer's pilot fertilizer mixing plant. As a prime supplier of nitrogen to the industry, Spencer makes reports of all experiments available to every manufacturer. Whether you use SPENSOL GREEEN or not, you can obtain copies by writing to Spencer at the address below—or if you would like help on a specific problem, just contact your Spencer representative.

How SPENSOL GREEEN Cuts Your Corrosion Costs In Half:

Laboratory tests of competitive ammoniating solutions show:

Sample Number	Corrosion (In. Per Year)	Variation From SPENSOL GREEEN
Brand A	.021	91%
Brand B	.024	118%
Brand C	.300	2,630%
Brand D	.022	100%
Brand E	.234	2,030%
Brand F	.017	54.5%
Old SPENSOL	.017	54.5%
SPENSOL GREEEN	.011	——

Save repair costs, parts, and down time by doubling the life of your equipment with non-corrosive SPENSOL GREEEN!

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Works: Pittsburg, Kans., Henderson, Ky., Vicksburg, Miss.

project to produce 25,000 annual tons of fertilizer in the Sukulu mineral complex. Kenya is the main market for fertilizer made at Sukulu.

INDIA

West Bengal government has secured agreement in principle from the Government of India to set up a fertilizer plant at Durgapur in collaboration with a Japanese firm. It is estimated that the investment of Rs 5 crores, 51% from the West Bengal government, 49% by the Japanese concern, would get the project under way. Rs 20 crores, the whole needed amount would be raised by loans to the government. Last month we erroneously placed this in Pakistan.

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Sindri and **Hindustan Chemicals & Fertilizers** are to be merged into a single corporation, as the first step toward bringing all fertilizer plants in the public sector under one management.

ISRAEL

Fertilizers & Chemicals, Ltd., Haifa, will get a major share of a $5,000,000 sum being put into Israeli concerns by Isreal Investors Corp., a New York outfit.

• • •

Fertilizers from garbage is the function of a $1,100,000 plant jointly proposed for Tel Aviv by Rassco and a US investment group.

PAKISTAN

The Multan fertilizer plant, a million dollar operation will be completed in March, and handed over to PIDC by the French.

PORTUGAL

Uniao Fabril do Azoto has signed an agreement with Monsanto to build a synthetic urea plant at Lavradio. The process will be Fauser-Montecatini and the plant will have a capacity of 40,000 annual tons. This is the 34th such plant using the Fauser-Montecatini process.

INDUSTRY PEOPLE

Bemis

Addison M. Smith, cost analyst for the Western operations of Bemis Bro. Bag Company, has been ap-

Prim

Daily

pointed assistant to the president of the company, it was announced by president Judson Bemis. The appointment is effective immediately.

Smith will move from the Bemis western operations headquarters in San Mateo, California, to the office of the president in Minneapolis.

Appointment of Donald E. Prim of Detroit as a field sales supervisor, was announced August 29 by Fred M. Dreyer, sales manager of the Indianapolis sales division.

In making the announcement, Mr. Dreyer said Mr. Prim will be responsible for sales in Michigan and Northwestern Ohio, and will continue to be heaquartered in Detroit. Mr. Prim joined Bemis in 1948.

U. E. Philpott, a field sales supervisor with offices in Indianapolis, will continue to be responsible for sales in Indiana, Kentucky and central and southern Ohio.

David I. Daily has been appointed the West Coast sales representative for the Bemis packaging service unit, it was announced by W. J. Geimer, manager. Mr. Daily joined Bemis in June of this year.

Davison

Roy W. Biddle has been appointed general chemical superintendent of the Florida Phosphate division of W. R. Grace & Company, Davison Chemical division, and will make his headquarters at Davison's Bartow, Florida installations.

He will be responsible for all chemical operations. William R. Fort is manager of the Florida Phosphate division.

A Davison employee for 13 years, Mr. Biddle was transferred from the company's Curtis Bay, Baltimore plant, where he was manager of the superphosphate plant.

Larson

H. W. Rodewald has joined L. L. Larson Machine Inc., Princeville, Ill. manufacturers of sprayers, liquid fertilizer applicators and accessories. He has been assigned to the midwestern territory including Michigan, Indiana, Ohio and Pennsylvania, as sales representative, operating from their home office in Princeville, Ill.

Prior to joining L. L. Larson Machine Inc., Mr. Rodewald spent 12 years with Hardie Manufacturing Co. as district sales manager serving a similar territory.

C.I.L.

Canadian Industries Ltd, Montreal, Canada has announced: Dr. R. W. Allgood, production manager, chemicals division; W. H. Rockwell, traffic and customs manager.

AP&C

Harry L. Carroll has joined American Potash & Chemical Corporation as a sales representative, it was announced by William W. Young, Southern region sales manager.

Carroll

Mr. Carroll, who has four years' experience in chemical sales work, will headquarter in the regional offices in Atlanta and specialize in sales to the pulp and paper industry.

A native of Georgia, he graduated from the University of Georgia in 1950 and later studied forest products processing at the University of Maine.

US Borax

Appointment of Jay B. Ford as director of administration for United States Borax & Chemical Corporation is announced by President James M. Gerstley.

Ford

Mr. Ford, a graduate of Stanford University and Harvard School of Business, joined U. S. Borax in 1947 as a sales trainee and advanced successively to the positions of salesman, assistant treasurer, assistant

general manager for potash, assistant general manager for borax, and recently was executive assistant to the executive vice president, Hugo Riemer.

Olin Mathieson

Dr. Ulysses S. Jones, Jr., formerly chief agronomist for Olin Mathieson Chemical Corporation at North Little Rock, Ark., has been named head of the agronomy and soils department at the Clemson College School of Agriculture.

Jones, Jr.

Dr. Jones, who succeeds Dr. G. H. Collings, joined Olin Mathieson's agricultural chemicals operations in 1953.

A native of Portsmouth, Va., he was graduated from Virginia Polytechnic Institute in 1939 with a B.S. degree in agronomy. He received his master's degree in soil chemistry from Purdue University in 1942, and his doctorate from the University of Wisconsin in 1947.

NPFI

Dr. James M. Brown, formerly agronomy extension specialist for the North Carolina Extension Service has been named district representative for the National Plant Food Institute, covering the states of Alabama, Mississippi, and Tennessee.

Brown

The announcement of the appointment of Dr. Brown was made by Dr. Robert L. Beacher, Southern regional director for the Institute, with offices in Atlanta. Dr. Brown will make his headquarters at 1071 Terrace Acres, Auburn, Alabama.

Born on a farm near Clayton, Ala., in 1925, Dr. Brown received his Bachelor of Science degree in Agricultural Science from Alabama Polytechnic Institute (now Auburn University) in 1949 and his Master of Science degree in Agronomy (Soils) under an American Potash Institute Assistantship in 1951. He received his Doctorate in Soils at North Carolina State College in 1960.

Paul T. Truitt, president of the Institute, said "we are most fortunate in obtaining the services of such an outstanding scientist as Dr. Brown."

Virginia Tech

Dr. Thomas J. Horne, head of the agricultural educational department of the Virginia Tech school of agriculture, has been appointed to the newly created post of director of instruction in the school of agriculture.

Owens-Illinois

Thomas W. Brown, Jr., general manager of the Owens-Illinois Glass Co., multiwall bag division has been named president of the division.

PC&F

Allen E. Terrell has been transferred to the Kauai branch of Pacific Chemical and Fertilizer Co., at Puhi, Hawaii, to fill the post vacated by Louis Maurina (see our September issue when he was transferred to Hilo.

CCA

Clarence Perkins has been transferred to be manager of Consumer Cooperative's Kansas City plant. His post at St. Joseph will be filled by Lowell Sandven, transferred from the Humboldt, Ia. liquid mixed fertilizer plant.

Southern Nitrogen

Horace Forshee has been promoted to assistant director of sales-agriculture for Southern Nitrogen Co.

Davison

George H. Reid, Jr. has been appointed manager of Davison's mixed fertilizer operations in Baltimore, Maryland. Mr. Reid has been associated with Davison since 1951. He has worked with Davison's Fort Pierce, Florida plant, Joplin, Missouri plant and until his present promotion, has worked on the sales staff at Davison's home office at 101 North Charles Street, Baltimore, Maryland.

W. N. Watmough, Jr., vice president, Davison Chemical Division, W. R. Grace & Co., announced the appointment.

Kemptville Agricultural School

D. E. Logsdail has been appointed head of the division of Chemistry, Soils and Fertilizers, at the Kemptville Agricultural School. He succeeds W. B. George who is retiring. The appointment is effective October 1.

Charles A. Gracey has been appointed Instructor and Extension Specialist in the Animal Husbandry Division at the same school.

Technicon Controls

Morton Harloe has joined Technicon Controls, Inc., Chauncey, New York, as field applications engineer.

He will be active in developing research and onstream applications of the Technicon AutoAnalyzer, a system of automatic continuous chemical analysis.

Prior to joining Technicon, Mr. Harloe was sales manager for the Masonry Construction Corp., and Chemiquip Company.

West Virginia P&P

J. Frank Greeley has been named Western district sales manager for the multiwall bag division of West Virginia Pulp and Paper Company, it has been announced by Jason M. Elsas, Southern regional manager. Frank Greeley will make his headquarters at the company's Torrance, California plant. He succeeds Frank L. Smith who has resigned to accept a position with another firm in an entirely different field.

Greeley

In his new position Mr. Greeley will be responsible for the sale of the division's products in the Western sales district which includes the States of California, Arizona, Nevada, Oregon, Washington, Idaho, Utah, Wyoming, Colorado and most of New Mexico. He will head a sales force working out of offices in Torrance, San Francisco and Denver.

Mr. Greeley is a veteran of thirty years experience in the multiwall bag industry and joined West Virginia in April, 1958, when the company established its multiwall bag division.

Spencer

The assignment of William L. Elleman as assistant to the vice president of Spencer Chemical Company's agricultural and industrial chemicals divisions has been announced. In his new position, Mr. Elleman will assist Byron Kern, vice president of the two divisions in coordinating and directing special projects and in developing and carrying out plans for future growth. He will make his office in Spencer's General Offices in the Dwight Building, Kansas City, Mo. Mr. Elleman joined Spencer in 1942. In his new job, he will continue as president of Dura-Pak, Inc., a wholly-owned Spencer subsidiary.

Elleman

Appointment of two sales repre-

sentatives and a change in assignment for another has been announced by Ray White, general sales manager for Spencer's agricultural chemicals division.

The new salesmen are William F. Harris, who will represent Spencer in Mississippi and Louisiana, and John Naylor, who will become Spencer's second salesman in Missouri. In a change of assignment, Charles Majors, sales representative in New York and Pennsylvania, will move to the company's North-Central District as a technical service representative. Mr. Majors joined the company in 1957.

Monsanto

Two chemists now in the research department of Monsanto Chemical Company's inorganic chemicals division have been promoted to group leaders, Dr. Richard S. Gordon, director of research for the company's Agricultural chemicals division, has announced.

Dr. Riyad R. Irani and Carl P. Schumacher become leaders of nitrogen research groups in the company's newly created agricultural chemicals division. They will report to Dr. Joseph G. Stites, Jr., assistant research director.

IM&C

Deall Daymon has been named operations research consultant in the industrial engineering department of International Minerals & Chemical Corporation. Prior to joining IMC he was product manager with Princeton Division of Curtiss-Wright Corporation. Previously he was a management consultant with Booz, Allen & Hamilton, and for five years was operations research engineer for Arabian American Oil Company in New York and Saudi Arabia.

Black Products

The Black Products Company of Chicago has announced the addition of sales and engineering personnel in the Southern and Western territories in line with their expansion plans for the Black Diamond line of valve bag packing equipment.

Geore H. Garrett was appointed Southern District Manager with headquarters at 2002 Puritan Drive, Irving, Texas to serve the Gulf and Southwestern States. Harry N. Bullard was named Western District Manager for the West Coast States sales and engineering, with headquarters at 10702 Second Avenue, Inglewood, California.

Allied Chemical

The appointment of Harold R. Schneider as assistant sales manager for agricultural chemicals produced by Allied Chemical's General Chemical division has been announced by John L. Damon, director of agricultural chemicals.

With the division 14 years, Mr. Schneider has been executive assistant for agricultural chemicals for the past four years. Earlier he served as agricultural field manager at General's Philadelphia sales office.

Smith-Douglass

M. W. Mawhinney, manager of the Smith-Douglass Streator, Ill., plant, has announced the appointment of Brock L. Hessing as sales representative in Northwest Indiana.

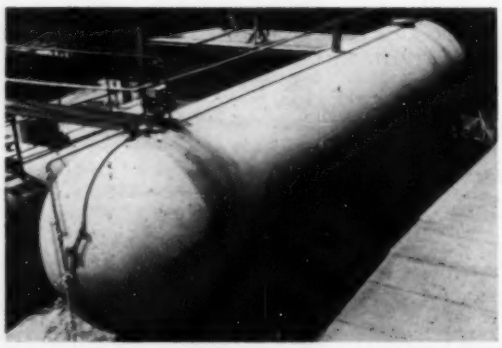
Mr. Hessing started with Smith-Douglass in May 1960 after graduating from the University of Missouri with a B.S. in Agriculture.

Maas

A. R. Maas Chemical Co., division of Stauffer Chemical Company, has promoted James R. Bothel to the position of assistant general manager and Charles W. Stager to production superintendent. Mr. Bothel was formerly assistant to the general manager and Mr. Stager was plant superintendent.

Homer W. Clinton has been promoted to the position of plant superintendent, South Gate, Calif. Plant.

Mr. Clinton, a chemical engineering graduate of Oregon State College, joined A. R. Maas in 1945.



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Useful Publications

How to Fertilize Trees and Measure Response is the title of a publication made available by NPFI in cooperation with the University of Washington. It was authored by two Washington men — Dr. Stanley P. Gessel and Kenneth J. Turnbull, together with NPFI's regional director, F. Todd Tremblay. Copies, at 50c are now available from Dr. Gessel at the University, Seattle, Washington and from NPFI's Publications Division, 1700 K St. N.W., Washington, D. C.

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How Proper Fertilization Can Pay has been published by the American Potash Institute, 1102 16th St. N.W., Washington 6, D. C. and is available—free up to 99 copies; above that $1 per 100. It is a valuable new sales tool covering good management practices on grasses and legumes, and the use of N,P and K.

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IMC TECHNICAL SERVICE BEGINS TRAINING CLINICS

The most persistent technical problems facing the fertilizer manufacturer today are those involving semi-granulation, formulation, and granular production. This is the conclusion reached after tabulation of service calls for the early months of operation of the recently organized technical service staff of International Minerals & Chemical Corporation.

The reports are believed to be a reliable barometer of the industry's technical problems, coming from IMC's five technical service regions covering the United States and Canada east of the Rocky Mountains.

General service calls, with no one problem standing out, accounted for 113 of the total of 445. The remaining 332 were divided as follows: semi-granulation 50; formulation 48; granular production 42; equipment and production 37; general production 37; product service call 30; pan granulator 18; liquid fertilizer 17; X-O-X production and preneutralization 16; bulk blending 16; acidulation 14; and specialty grades 7.

Problems in semi-granulation, which headed the list with 50 calls, have multiplied as smaller plants seek to meet the competition of the fully granulated plants, in the opinion of Richard G. Powell, IMC manager of Technical Service.

"Semi-granular units generally are installed as stop-gap measures to let the owner decide whether to go ahead with investment in the more expensive full granulation unit," he explained. The conversion of a plant producing pulverized fertilizers to semi-granular operation provides problems in particle sizes, nitrogen losses, and other areas."

He noted that formulation problems, second highest at 48, most frequently covers two categories—the most economical way of formulating for the exact product desired, and the avoidance of off-analysis materials through losses and overages. Trained technical service men have been very successful in assisting in all areas of formulation.

Granular production, next in line with 42 requests, is tied closely to formulation, Mr. Powell noted. He said granulating unit owners constantly seek a minimum of recycling and maximum of on-size materials to get the most from their equipment.

The classifications "general production" and "equipment and production" were differentiated in that the former refers to a complete re-evaluation of the entire production system of a given plant; the latter indicates that technical service was called on regarding a specific piece of equipment and its relation to the production problem.

IMC's technical service department currently is working on two relatively new concepts, Mr. Powell said.

One is an attempt to categorize and "can" certain information which seems to be requested most frequently. For example when a fertilizer manufacturer requests help on material handling systems, unit operations, types of buildings, and other subjects, all pertinent information would already be packaged.

Proposed layouts, cost estimates, and other vital data would be supplied immediately upon request. Even when individual cases varied slightly, the "canned" information would provide a starting point and would move the problem to solution more quickly.

Clinic Program

The second new step is the previously announced series of fertilizer training clinics to be conducted in 11 cities this fall by IMC. Featuring technical service, these clinics will offer discussion and solutions to some of the more vital problems presented by fertilizer manufacturers.

More than 400 representatives of fertilizer manufacturing companies are expected to attend. Schedule of meetings:

October 24-25, Minneapolis; October 26-27, Indianapolis; November 9-10, Baltimore; November 14-15, New York City; November 16-17, Raleigh, N. C.; November 21-22, Toledo, Ohio; November 28-29, Winter Park, Fla.; November 30-December 1, Montgomery, Ala.; December 5-6, Kansas City; December 12-13, Tyler, Texas; December 14-15, Jackson, Mississippi.

Soil Sample Campaign Repeated

A special campaign urging farmers to test their soil this fall is being launched in Minnesota again this year.

Last fall, a similar campaign boosted by 1,300 the number of samples sent to the University's soil testing laboratory during September, compared to the same month of 1958. In October, total number of samples tested was 4,096 in 1959, compared to 3,261 in 1958 and 2,811 in 1957.

Also, total samples tested by the University in 1959 went over 30,000 for the first time.

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Safety School Largest Ever; Fertilizer Section Meets Oct. 17-18

Fertilizer men from an eight-state area chalked up a record attendance for the Southeastern Regional School on Accident Prevention in Fertilizer Plants held in Wilmington, N. C., August 25-26.

Ninety-three were present, making it the largest group ever to attend such a school in the United States. Representation also included 17 companies and 29 plants from the two Carolinas, Alabama, Georgia, Florida, Kentucky, Tennessee, and Virginia.

The accident frequency rate in the fertilizer industry nationally in 1959 was 22.2 per one million manhours compared with 10.6 for members in the National Safety Council. This is not coincidental, nor does Council membership guarantee this result. It does mean that the cost-conscious, sound, business managers of many fertilizer companies have recognized the need for an accident prevention program and have enlisted the services of the National Safety Council to help build and maintain a sound safety program. The responsibility for the results of any accident prevention program lies of course directly on management.

As a part of this responsibility, training of supervisors in accident prevention is necessary. Both the National Plant Food Institute and the Fertilizer Section of the National Safety Council, recognizing this need, have jointly sponsored a series of Supervisory Safety Training Schools. These schools have been carried on now for three years and they are about to be concluded with one for the Far West region of the country on October 26 and 27 at the Hacienda Motel, Fresno, California, and the other for the Southwest region on November 8 and 9 at the Jung Hotel, New Orleans, Louisiana. The Farwest school is to be under the direction of Austin R. Cline, Shell Chemical Company, Ventura, California, and the Southwest school is to be under the direction of Harold Hailey, Smith-Douglass Company, Texas City, Texas. Good, efficient management should consider these schools, if within reasonable distance, as a very worthwhile endeavor for supervisors.

A good place to start on the road to a successful safety program is the National Safety Congress in Chicago. The Fertilizer Section will hold its meetings in the Morrison Hotel on October 17 and 18. The Executive Committee of the Section will hold its meeting on October 19. Many safety representatives of the fertilizer industry will be on hand to pass on to others the programs and experiences they have followed which have given them better accident records.

MISSISSIPPI COUNCIL ANNUAL CONVENTION ELECTS BLOUIN

At the final session of the 1st annual convention of the Mississippi Soil Fertility and Plant Food Council the group elected Mike R. Blouin, Jr., of Columbus, president to succeed H. S. "Bill" Gordon, Jr., of Jackson.

W. F. Harris of Jackson was elected vice president. Re-elected secretary-treasurer was W. L. Ashley of Jackson.

Mississippi farmers could economically use two to three times more commercial fertilizer and nitrogen, declared W. R. Thompson, agronomist, of the Agricultural Extension Service, Mississippi State University, at the opening session at the Buena Vista Hotel where some 230 fertilizer dealers, salesmen, manufacturers, agronomists, and educators convened.

His report was based on a survey just completed.

Assisting Mr. Thompson with his report were T. M. Waller, associate Extension agronomist and K. L. Anderson, assistant Extension agronomist.

Underscoring reports made earlier by Extension Service and Experiment Station agronomists, W. F. Price, general manager, Swift & Company Agricultural Chemical Division, Chicago, declared "farmers generally are losing profits by not using recommended rates of fertilizers. Georgia farmers for instance," he pointed out, "lose $264,000,000 annually by not following the recommendations of Experiment Station reports."

John Zigler, vice president International Minerals & Chemical Corporation, declared "The entire credit outlook of our industry needs overhauling." Rather than fertilizer dealers extending credit to farmers, he proposes that banks and government lending agencies do more of it.

W. P. McMullan, Jr., vice president Deposit Guaranty Bank & Trust Co., Jackson, emphasized that the bankers' thinking in relation to the farmer's needs, is undergoing a change. He stressed the higher and more long term financing requirements of a modern farm business. "With the accelerated rate of mechanization on our farms, the intermediate farm credit has come into a place of importance," he explained.

Strong optimism about the future of Mississippi's agriculture was expressed by Owen Cooper, executive vice president Mississippi Chemical Corporation, Yazoo City. Mr. Cooper predicted that "we are going to have larger farms, more efficient farms, higher per capita income on our farms. This will permit better land utilization, more livestock and a tremendous upsurge in forestry and forest products."

The council voted to return to the Buena Vista Hotel in 1961 for their second convention, setting the date for August 10-12.

Fission May Supply Nitrogen

Although nuclear fission does not appear to have an immediate future in the manufacture of fixed nitrogen, the nation's chemical engineers have been advised to continue "moderate" cheminuclear research because of the possibility of a "favorable situation."

This advice was given to the American Institute of Chemical Engineers by M. Steinberg, L. Green and J. R. Powell.

"There is no inherent barrier against the large-scale production of fixed nitrogen by a fission recoil process," they reported. "However, because of the many technical problems requiring solution, the development can be costly and time-consuming.

"Nevertheless, because of the importance of fixed nitrogen and the possibility that a favorable situation may arise in the future, moderate research efforts should continue."

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Signed: Ernest H. Abernethy, President
Sworn to and subscribed before me, a Notary Public, this 17th day of September, 1960.
Mary C. Layman, Notary Public
(My commission expires August 2, 1964.)

COMMERCIAL FERTILIZER
1960 YEAR BOOK
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CF Staff-Tabulated TONNAGE REPORTS

FERTILIZER TONNAGE REPORT (in equivalent short tons) Compiled by Cooperating State Control Officials and Tabulated by COMMERCIAL FERTILIZER Staff

	August		July		April-June Quarter		January-June		July-December		YEAR (July-June)	
STATE	**1960**	**1959**	**1960**	**1959**	**1960**	**1959**	**1960**	**1959**	**1959**	**1958**	**1959-60**	**1958-59**
Alabama	-------	24,068*	16,645	23,905*	612,918	549,564	869,240	846,309	180,959	199,250	1,050,199	1,045,560
Arkansas	8,666	9,071	20,558	17,619	204,314	175,590	303,835	289,363	58,713	63,767	362,548	353,130
Georgia	25,274	32,120	83,684	80,725	947,423	955,705	1,102,220	1,130,998	299,194	294,751	1,401,414	1,425,749
Kentucky	-------	-------*	-------	7,093*	319,164	307,715	456,676	483,820	108,734	99,460	565,410	591,380
Louisiana	7,120	8,426	13,765	13,972	150,438	122,382	224,087	201,642	66,744	64,152	290,821	265,794
Missouri	-------	55,435*	-------	23,095*	434,606	390,699	516,179	563,055	277,708	370,036	793,887	933,090
N. Carolina	-------	12,155*	14,403	13,485	988,133	842,771	1,381,263	1,468,704	175,533	228,055	1,556,796	1,696,759
Oklahoma	-------	9,853*	6,545	6,567	52,726	38,937	72,246	64,738	72,511	68,848	144,757	133,586
S. Carolina	14,203	11,817	11,122	12,632	411,739	370,628	678,986	756,100	104,903	134,202	783,889	890,302
Tennessee	-------	26,551*	17,626	15,644	353,905	292,705	480,429	443,602	117,275	127,116	607,727	570,718
Texas	32,845	27,081	34,355	36,002	281,701	228,767	474,627	441,851	233,410	222,800	708,037	664,651
California		(reports compiled quarterly)			-------	485,672*	813,116	803,261	465,495	459,735	-------	1,262,996*
Mississippi		(reports compiled quarterly)			-------	309,778*	-------	516,917*	142,576	176,371	-------	693,288*
Virginia		(reports compiled quarterly)			369,502	303,300	591,113	618,965	141,177	160,178	732,290	779,143
Indiana				(reports compiled semi-annually)			828,164	856,316	321,956	316,341	1,150,120	1,172,657
TOTAL	**88,108**	**88,115**	**218,703**	**220,551**	**5,126,569**	**4,578,863**	**8,792,181**	**8,980,121**	**2,766,888**	**2,985,062**	**10,147,895**	**10,522,519**

------- (not yet reported) * Omitted from column total to allow comparison with same period of current year.

ROBERT B. LENHART
joined PCA in 1956 and is Sales Representative for the Northeast. A graduate of N.Y. State Agricultural School, he is president of the Empire Soil Fertility Ass'n, and is a board member of the New Jersey Plant Food Educational Society.

FRANK H. KENNEDY
is PCA's Sales Manager for the Midwest, with offices in Peoria. He is a graduate of the Catholic University of America, was a wartime naval aviator, and has broad experience in the plant food industry, having joined PCA in 1950.

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